B. T. U. Quota Club Congress Invades Dayton

The Florida delegation to the Frigidaire Quota Club Congress pauses long enough in its tour of the plant to set a seal of approval on the new Moraine line. The president and vice president of the congress were included in the group.

The three most outstanding figures at the Quota Club Congress: H. B. Newell (center) new vice president in charge of sales, Claude Wolfe, president of the club (right), and Cecil Kirby, vice president.

Judges of Frigidaire's national radio contest confer on some of the 216,000 entries. Left to right, Harry Mercer, American Rolling Mills Co.; F. M. Cockrell, publisher, Electric Refrigeration News; L. E. Moffatt, editor, Electrical Merchandising.

F. M. Connors, Boston, was the first man to qualify for the Quota Club Congress in 1931.

Frigidaire's 187 star members of the selling organization pose for the Congress picture in front of one of the Moraine plant buildings. The sunflower-like badges in the front row, standing, indicate cabinet members.

T. F. O'Keefe, cabinet member from New York City, sold 251 per cent of his quota in 1931.

Congress delegates hold up the procession to watch a step in the assembling of Frigidaire ice cream cabinets at the Moraine plant.

C. R. Godfrey, vice president in charge of production, who was host to Congress members at luncheon Thursday, greets the Congress president.

Field and factory shake hands on the Frigidaire proposition as Congress delegates see how an ice cream cabinet's insulation goes in.

The Pacific Coast gang was the first to arrive for the Quota Club Congress, and were photographed after they had left the train at the Dayton station. They appear all wrapped up for winter weather which did not appear.

Officers and cabinet of the Congress are (left to right): George McMullen, O. E. Ross, W. W. Lewis, and W. J. Laperouse, cabinet members; Claude H. Wolfe, president; Cecil E. Kirby, vice president; R. M. Hall, P. D. Sims, J. E. Pemberton, and T. F. O'Keefe, cabinet members.

WRITTEN TO BE READ ON ARRIVAL

Merchandising Section

IN TWO PARTS PART ONE

ELECTRIC REFRIGERATION NEWS

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The business newspaper of the refrigeration industry

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TEN CENTS PER COPY
THREE DOLLARS PER YEAR

WIRED HOME MARKET SATURATION 17.5%

General Electric Starts War On Sales Resistance

Distributors Plan New Sales Campaign at Winter Meeting in Coral Gables

By George F. Taubeneck

CORAL GABLES, Fla.—War! Swinging into action almost immediately after his inauguration as first President of Refrigerania, Art Dunning of Duluth read a declaration of war upon the state of Sales Resistance before almost 200 General Electric refrigerator and range distributors, home office men, and representatives in convention assembled at the Miami Biltmore hotel, here, Feb. 1, 2, and 3. The declaration was unanimously approved by the assembled delegates.

Beginning at sunrise on Monday, March 14, the Monitor Top War Campaign—newest of the General Electric refrigeration sales contests—will last until midnight of Tuesday, May 31, a total of 67 fighting days. This becomes the first war on record, the duration of which can be predicted in advance. (Complete details of the contest may be found on page 4, column 4 of this issue.)

Distributors who gathered for this "25 Plan Convention" had more to cheer for than the announcement of the new sales contest and the inauguration of President Art Dunning.

They heard welcome news of longer discounts, and were given complete sales plans for General Electric Hotpoint ranges, which they will sell as companion products to General Electric refrigerators during the coming year—both of which messages opened doors toward increased profits for them in 1932.

They also cheered Walter Landmesser's announcement of the new "conditioned air" commercial line—which will fill a considerable gap in General Electric refrigeration products—and applauded Walter Daily's declaration that $6,000,000 would be spent in advertising

(Concluded on Page 4, Column 1)

PFEIL NAMED FRIGIDAIRE HEAD FOR NEW ENGLAND

BOSTON—John S. Pfeil has been appointed manager of the Frigidaire Sales Corp. of New England, according to announcement by Frigidaire Corp. He succeeds H. W. Newell, who has gone to Dayton headquarters as vice president in charge of sales for Frigidaire Corp.

Other officials of the Frigidaire distributing organization in New England as announced for 1932 are: T. A. Farrell, Springfield, Mass., assistant manager; H. A. Valencourt, Newton Centre; Mass., general sales manager; E. H. Richardson, Newton Centre, district sales manager; F. W. Smith, Somerville, Mass., district sales manager.

C. E. Skoglund, Simsbury, Conn., district sales manager; L. S. Kimball, Swampscott, Mass., sales manager of the public utilities division; J. H. Taylor, Winchester, Boston retail sales manager; J. T. Shaughnessey, Boston commercial sales manager; J. F. Cain, Brighton, sales promotion manager.

L. W. Retezel, comptroller; G. W. Brett, distribution manager; F. M. Long, service manager, and F. F. Doten, assistant to the manager.

COPELAND TO HAVE DISPLAY AT 1933 WORLD'S FAIR

CHICAGO—Louis Ruthenburg, president of Copeland Products, Inc., Mt. Clemens, Mich., has signed an application for exhibition space in A Century of Progress, Chicago's World's Fair, in 1933.

Both domestic refrigeration and air conditioning will be demonstrated in the Copeland exhibit, and practical applications will be shown in the housing group, both in apartment and house refrigeration. In the Hall of Science a basic scientific exhibit will show the construction of Copeland equipment.

HOME SERVICE GIRLS TO STUDY BY MAIL

CLEVELAND—A correspondence course in home service for women in the field who wish to broaden the scope of their home service work has been prepared by Edwina Nolan, home service director of the electric refrigeration department of the General Electric Co.

The course is designed to give a "different" story of refrigeration, one that is concise and elementary, according to Miss Nolan. The story of electricity is built up so that home service women can intelligently answer the questions asked by the prospects or users.

The course will come to those taking it in the form of booklets containing illustrated lectures. At the end of each booklet is a list of questions on the lecture, which the student should answer on the honor system, after carefully reading through the lecture. Answers are then mailed to the central office in Cleveland.

1931 SALES GAIN OF LIQUID COOLER 71%

DETROIT—An increase in sales of 71 per cent as compared with 1930, and an increase of 45 per cent in number of active distributors at the end of the year was reported by the Liquid Cooler Corp. at a recent meeting of its stockholders.

The new catalog of 1932 models was shown to the stockholders at that time. It is a combination sales manual and catalog in colors, divided into sections. Each of these describes a definite type application, complete with line drawings and pictures of models to illustrate the method of hook-up.

Applications for multiple water cooling, circulating, dead end, duplex and beverage are each described in full.

McELHINNY CHOOSES RIDDELL FOR FIELD WORK

MT. CLEMENS, Mich.—George P. Riddell has been appointed to the field force of the commercial department of Copeland Products, Inc., according to W. D. McElhinny, vice president of Copeland. Mr. Riddell will work with distributors and dealers to develop the commercial side of their business.

Mr. Riddell has been in the refrigeration field for 20 years. His first training was with his father, Emmet C. Riddell, when the latter was chief engineer of the Naugautuck Valley Ice & Cold Storage Co.

COPELAND NAMES ASSISTANT SECRETARY-TREASURER

MT. CLEMENS, Mich.—The appointment of Milton E. Stover as assistant secretary-treasurer of Copeland Products, Inc., has been announced by Louis Ruthenburg, president of the corporation.

Prior to his appointment with Copeland, Mr. Stover had been with Ernst & Ernst, certified public accountants, for six years.

FRIGIDAIRE OPENS RADIO PROGRAMS ON 57 STATIONS

Feminine Names Feature Broadcast Three Nights Weekly

DAYTON—Fifty-seven stations in all parts of the country carried the first of the new Frigidaire three-times-a-week radio programs Feb. 1. The programs during the next six months will blanket areas containing more than 90 per cent of all the radio sets in the United States, according to E. D. Doty, advertising manager.

Mr. Doty characterizes it as the most extensive series of radio programs ever devoted exclusively to electric refrigerators and refrigeration equipment.

Program material is prepared to appeal to women. A 16-piece orchestra will play popular numbers and Charles B. Driscoll, editor of the McNaught Syndicate, will talk on each program upon women's names, their derivations,

(Concluded on Page 11, Column 3)

Contest Winners

DAYTON—Anna E. Johnson, of 1540 Shehy St., Youngstown, Ohio, is the winner of $1,000, the first prize in the Frigidaire National Radio Contest, according to the decision of the judges, submitted to Frigidaire Corp., Jan. 20.

Mrs. Johnson won in competition with 216,000 persons who entered the contest. Ten second prizes of new W-6 Frigidaire models, and 50 third prizes of $50 each were also awarded.

Judges in the contest were: L. E. Moffatt, managing editor, *Electrical Merchandising*, New York; F. M. Cockrell, publisher, ELECTRIC REFRIGERATION NEWS, Detroit; and H. V. Mercer, advertising manager, American Rolling Mills Co., Middletown, Ohio.

The contest was announced over 40 radio stations on the Frigidaire programs during the period from Nov. 30 to Dec. 16. The contest ended at mid-

(Concluded on Page 11, Column 3)

J. A. STERLING APPOINTED NORGE PROMOTION HEAD

DETROIT—James A. Sterling, former divisional manager for Maytag Washing Machine Co., has been appointed sales promotion manager of Norge Corp., according to John H. Knapp, vice president in charge of sales.

Mr. Sterling has been helping R. E. Caldwell of the Cramer-Krasselt advertising agency prepare a series of sales promotional material for the use of Norge distributors and dealers.

The sales helps are being sent in to the field. Mr. Sterling is taking charge of the new department and Mr. Caldwell is returning to Milwaukee, agency headquarters.

MAJESTIC RADIO EXPORTS INCREASE 120%

CHICAGO—Export sales of Majestic radios increased more than 120 per cent during 1931, according to Harry J. Scheel, export sales manager. As a result, export shipments comprised almost 10 per cent of total shipments, Mr. Scheel reports.

England, New Zealand and South Africa are largely responsible for the growth of the export business. A growing distribution also exists in the Philippines, Hawaii and Cuba.

The 1932 Grigsby-Grunow line consists of nine standard wave models, including seven consoles and two midgets, three short wave converters, and two combining short and intermediate waves. Prices range from $38.50 to $290.

3,578,000 Out of 20,441,249 Now Using Refrigeration

Final Returns Bring Total Sales for 1931 by All Companies Up to 965,000

By F. M. Cockrell

DETROIT—Revised estimates of total sales of household electric refrigerators by all U. S. manufacturers during the year 1931 based on confidential figures and definite information from reliable sources concerning 50 different companies and with an allowance of less than 1,000 units for 20 other small concerns, show a total of 965,000 units sold during the second year of the well known depression.

My advance estimate of 925,000, published two weeks ago, turned out to be unduly conservative. At that time I was still in the dark about several companies whose activity might justify the assumption that they were factors of some importance but whose hesitancy about giving up detailed figures influenced me to discount news reports of their sales. But there are various ways of getting dependable data when production executives are secretive and sales managers are inclined to exaggerate.

Purchases of unit parts, particularly those items which are bought each month only as needed to complete the assembly of the finished product, furnish a good index to the actual shipments to dealers. Credit reports usually tell the story when promotion plans have proved ineffective or mechanical difficulties have stopped progress.

The figure of 965,000 household refrigerators sold in 1931 sets a new high mark for the industry and provides the basis for some interesting deductions. Our problem of comparing the 1931 statistics with those of previous years, however, is made somewhat difficult due to the fact that 1931 sales are figured on the basis of "low-sides" or cooling units, whereas all previous estimates were made on the basis of "high-sides" or compressor units. Multiple installations in apartment buildings, in which one compressor is used to operate a number of cooling units, account for the excess of "low-sides" over the number of compressors sold each year.

Unfortunately, the figures collected a year ago (published in the Jan. 14, 1931,

(Concluded on Page 2, Column 1)

DOMESTIC INDUSTRIES PLANS DEALER DRIVE

By Phil B. Redeker

DETROIT—A coast-to-coast distribution set-up will handle the line of Buckeye electric refrigerators which have been placed on the market by Domestic Industries, Inc., of Mansfield, Ohio, according to Philip McClay, factory representative, who interviewed, during the past week, some 200 Michigan hardware, furniture, electrical dealers and utility representatives who may take on the Buckeye line.

While present distribution is being carried out almost entirely by department stores and furniture companies (Domestic Industries is a major furniture manufacturing concern), Mr. McClay is traveling about the country with a view to establishing distributorships at central points which will operate dealerships in exclusive areas.

There are two models in the Buckeye line, the smallest having 4.7 cu. ft. net food storage capacity and retailing at

(Concluded on Page 11, Column 4)

KELVINATOR JANUARY SHIPMENTS GAIN 23%

DETROIT—Kelvinator shipments for the month of January are 23 per cent ahead of those for January, 1931, according to H. W. Burritt, vice president in charge of sales of Kelvinator Corp. Shipments for January, 1931, were 12 per cent greater than those for the same month in 1930.

Orders received during January were 30 per cent in excess of orders received during January, 1931, Mr. Burritt reports, and Kelvinator Corp. entered February with more than double as many unfilled orders on hand as a year ago.

Mr. Burritt attributes part of the upward curve in the business to sales promotion and advertising by the Electric Refrigeration Bureau.

Leonard Sales Up

DETROIT—Shipments by the Leonard Refrigerator Co. for the month of January exceeded those for January, 1931, by 34 per cent, according to R. I. Petrie, sales manager of the company.

EXPORT MANAGER APPOINTS INDIA REPRESENTATIVE

DETROIT—Appointment of H. A. Dunlap as representative in India, Burma, and Ceylon, has been announced by the H. M. Robins Co., export department for Copeland Products, Inc.

Mr. Dunlap has been for the past seven years representative for a number of American companies in this same territory. He will arrive in India the latter part of February.

"Not only is mechanical refrigeration needed in the hot climate of India to preserve food and cool drinks," said Mr. Dunlap, "but the humidity of the country offers a good market for room coolers which both cool the air and dehumidify it."

WESTINGHOUSE CO. ELECTS BUCHER VICE PRESIDENT

NEW YORK CITY—At a meeting of the board of directors of the Westinghouse Electric International Co., Jan. 27, George H. Bucher was elected vice president and general manager.

Mr. Bucher joined the Westinghouse organization Sept. 1, 1909, as a graduate student. He graduated from the Pratt Institute in Brooklyn in both steam and machine design and electrical engineering. He was transferred from the graduate student course at East Pittsburgh to the export department in New York, Jan. 20, 1911.

April 1, 1920, he was appointed assistant to general manager of the Westinghouse Electric International Co. July 1 of the following year he was appointed assistant general manager which position he held until his recent appointment.

WESTINGHOUSE SALESMEN OPEN 'DE LUXE' CONTEST

MANSFIELD, Ohio — Westinghouse refrigerator salesmen embarked on a six-weeks' contest in selling De Luxe models, Feb. 1. February has been designated as "De Luxe Month," according to announcement of the contest.

Four prizes will be awarded in each selling district as follows: to the man selling the most DWP and DWL-75 models, a check for $75; second man, $50; third man, $25; and fourth man, $15.

In addition, the highest man among the entire nine selling districts will be presented with a DWP-75 for his own home.

Sales and Stocks Itemized by "Big Ten" Manufacturers

MARKET SATURATION OF WIRED HOMES IS ESTIMATED AT 17.5%

(*Concluded from Page 1, Column 5*)

issue of the NEWS) did not show the number of extra cooling units *by years*, although an estimate of the total number of families using electric refrigeration at that time was made. Each manufacturer was asked to estimate the number of actual users of his machine with proper allowance for multiple installations and also for obsolescence. From these figures we arrived at a total of 3,000,000 users and with wired homes in the United States estimated at 20,438,774, the saturation of this market amounted to 14.7 per cent.

Incidentally, the estimate of wired homes for 1930 has since been revised downward by *Electrical World* and is now placed at 20,331,551. The additions to wired homes during 1931 were 109,698, making the total at the end of last year 20,441,249.

Estimate of Multiple Installations

Referring to the 10-year estimates of compressor sales published a year ago, the total given was 2,671,000. Substracting this from 3,000,000 (estimated number of users), we had 329,000 extra cooling units representing multiple installations during the entire period. The detailed figures recently compiled by the Refrigeration Division of National Electrical Manufacturers Association (Nema) and published in this issue give some indication of multiple installation business during the past four years but since these figures are for only 10 companies and do not include many concerns which specialized in multiple business, it is still impossible to make an accurate check.

The Nema figures for "extra low-sides" sold during the past three years seem reasonable. They are as follows:

1929	67,760
1930	30,568
1931	10,732

The above figures are not given in the tabulation but are obtained by subtracting line 19 (separate high-sides) from line 17 (separate low-sides). Looking at the above figures, one would conclude that the decline in extra low-sides has been due to the increased popularity of the self-contained systems since the advent of quiet operation of compressors.

The figure for 1928, however, is very puzzling. According to the record of 10 companies in Nema, including Frigidaire, Kelvinator and others which were very active in the multiple field, the extra low-sides for this year is only 2,204. There may be reasons for this figure, such as incomplete records or possibly cooling units were being purchased from outside manufacturers and were not included in the sales totals.

Further study of the data or advice from Glenn Muffly, who had personal charge of the Nema statistical work, may clear up this point. In any event, since the Nema companies alone are known to have sold 109,060 extra low-sides during the past three years, my estimate of 329,000 for all companies since the beginning of the business does not appear to be excessive.

Deductions for All Outage

After adding in the figure for 1931, however, it does seem advisable to make a suitable deduction for obsolescence, replacements, defective equipment and other loss of use of the original product, also for exports and stock still in dealers' hands.

The Department of Commerce reports exports of refrigeration sets up to ¼-ton capacity for 11 months of 1931 at 56,607. The Nema statistics show stocks on hand as of Dec. 31, 1931, as follows:

Factory, Branch and Warehouse	103,062
Distributors and Dealers	33,120
Total	136,182

If we allow 10 per cent for the combined outage from all causes, we have:

Total users, year ago	3,000,000
Add 1931 sales	965,000
	3,965,000
Deduct 10 per cent	396,500
Total users, Jan. 1, 1932	3,578,500
Divide by number of wired homes	20,441,249
Percentage of market saturation	17.5

Additional Statistics To Be Published

Additional statistics of the National Electrical Manufacturers' Association (Nema), will be published later. Included will be sales *by months* for 1930 and 1931, broken down to show the quantities for the various sizes and types of equipment the same as shown on this page by years. Total value of the combined household and commercial stocks on hand will also be given by months for the past two years.

Another important group of statistics to be published in a later issue will give a picture of distributor and dealer activity. This survey is the first of its kind to be made and will bring out some very interesting facts and figures which have heretofore been unknown. The data, which is now being analyzed, confirms the opinion published in recent editorials that a large proportion of the total volume of household sales are made by a relatively small number of retailers.

All of the market data already published, together with that scheduled for later issues, will appear in the 1932 REFRIGERATION DIRECTORY and MARKET DATA BOOK. In addition, the DIRECTORY will have many pages of other data. Wired homes by states, counties, and towns of 2,500 population or more, with the potential market for electric refrigerators, will be given in detail. Tabulations and charts will show the comparative sales records for other electrical appliances. Owing to the time required for collecting and analyzing this statistical material, the DIRECTORY will not be issued until about March 1.

Nema Sales for Four Years

Statistics compiled by Refrigeration Division, National Electrical Manufacturers Association (Nema). Companies represented: Copeland, Frigidaire, General Electric, Kelvinator (including Leonard), Norge, Servel (not including Electrolux), Tennessee Furniture, Trupar, Universal Cooler and Westinghouse. All figures are quantities except where the dollar sign is shown. All valuations are given in factory prices.

Where totals are shown in the two tabulations below, they are totals of manufacturers totals. It will be noted that some of the totals given exceed the sum of the items given. This is because some of the manufacturers submitted totals which were not itemized. For illustration, where two or more cabinet size classifications were grouped together by a manufacturer, it was impossible to separate them and the quantity is included in the total only.

The first six lines are for self-contained cabinets in which systems are installed, or for cabinets and systems sold as one item, whether or not the systems are actually installed in the cabinets before shipment.

Items 7 to 12, inclusive, are for cabinets sold separately from systems. They may be for either multiple or single remote installation. Cabinets shipped with low sides installed but no high sides are itemized separately as cabinets under items 7 to 12, inclusive, and the low sides itemized under item 17, breaking down the figures to show correctly under each item without duplication. Ice boxes or sales to other manufacturers are not included.

Item 18 shows how many household cabinets can be refrigerated by the material shipped, not necessarily the number of cabinets shipped. It is the figure which indicates the number of homes that have acquired electric refrigeration. It is the total of all household low sides.

Item 38 is the grand total in dollars only of items 22 and 37, showing the value of household and commercial sales for the period indicated.

HOUSEHOLD REFRIGERATORS

	1928	1929	1930	1931
Cabinets with Systems (One system per cabinet) Net Food Space				
1. Under 4.00 cu. ft.	.....	.....	6,650	2,940
2. 4 to 4.99 cu. ft.	494	2,626	35,427	78,219
3. 5 to 6.99 cu. ft.	18,369	15,928	58,798	86,697
4. 7 to 8.99 cu. ft.	2,375	2,540	8,606	23,335
5. 9 to 11.99 cu. ft.	607	415	4,373	2,886
6. 12 to 18.00 cu. ft.	75	50	2,065	826
Cabinets Only (No high or low sides) Net Food Space				
7. Under 4.00 cu. ft.	22,545	47,208	19,908	24,231
8. 4 to 4.99 cu. ft.	133,947	157,038	143,235	108,761
9. 5 to 6.99 cu. ft.	110,924	312,506	269,075	298,611
10. 7 to 8.99 cu. ft.	49,989	61,142	39,348	42,543
11. 9 to 11.99 cu. ft.	19,117	23,801	21,036	15,946
12. 12 to 18.00 cu. ft.	12,384	14,893	9,486	9,234
13. Total Items 1 to 6	21,920	21,559	115,919	194,903
14. Total Items 7 to 12	348,906	616,588	502,088	570,827
15. Total Items 13 and 14	370,826	638,147	618,007	765,730
16. Separate Systems	140,986	251,043	302,690	176,572
17. Separate Low Sides	214,536	431,895	267,587	329,913
18. Total Items 13, 16, and 17	**377,826**	**704,497**	**707,050**	**802,356**
19. Separate High Sides	212,332	364,135	237,019	319,181
20. Parts and Miscellaneous	$ 85,743	$ 156,446	$ 243,039	$ 743,301
21. Special Equipment	.....	.....	.....	.....
22. Total Household 15, 16, 17, 19, 20 and 21	**$62,717,682**	**$ 94,367,085**	**$ 93,854,989**	**$103,150,686**
23.				

COMMERCIAL REFRIGERATORS

24. Water Coolers with High Sides	13,192	28,181	32,314	20,367
25. Water Coolers with No High Sides	.....	.....	.....	682
26. Ice Cream Cabinets with High Sides	12,129	22,777	22,949	20,301
27. Ice Cream Cabinets with No High Sides	34,457	27,689	23,884	17,357
28. Milk Coolers with No High Sides	131	76	2	9
29. Room Coolers with No High Sides	.....	149	166	285
30. Counters and Commercial Boxes	237	1,899	3,504	1,522
31. Special Equipment	.....	.....	.....	.....
32. Extra Low Sides, Commercial	137,584	204,937	140,516	109,734
33. Extra High Sides	127,079	124,567	68,651	84,338
34. Parts and Miscellaneous	$ 668,835	$ 717,303	$ 489,710	$ 507,848
35. Total Items 24 to 29 and 32	**197,493**	**283,809**	**219,842**	**168,735**
36. Total Iems 18 and 35	**574,935**	**988,306**	**926,892**	**971,091**
37. Total Commercial 24 to 34	**$33,771,037**	**$ 35,808,142**	**$ 30,490,021**	**$ 24,671,716**
38. Grand Total, 22 and 37	**$96,488,719**	**$130,175,226**	**$124,345,010**	**$127,822,402**

Nema Stocks—Dec. 31, 1931

HOUSEHOLD REFRIGERATORS

	Factory, Branch and Whse. Quantity	Factory, Branch and Whse. Dollars	Distributors and Dealers Quantity	Distributors and Dealers Dollars
Cabinets with Systems Net Food Space				
1. Under 4.00 cu. ft.	2,040	196,716.55	549	52,712.45
2. 4 to 4.99 cu. ft.	6,479	672,051.50	3,438	352,180.80
3. 5 to 6.99 cu. ft.	6,561	869,095.77	4,944	636,102.90
4. 7 to 8.99 cu. ft.	2,504	429,184.96	2,527	451,578.25
5. 9 to 11.99 cu. ft.	446	98,404.30	311	68,180.00
6. 12 to 18.00 cu. ft.	220	55,231.00	259	65,968.00
Cabinets Only Net Food Space				
7. Under 4.00 cu. ft.				
8. 4 to 4.99 cu. ft.	35,647	934,340.12	6,949	161,817.00
9. 5 to 6.99 cu. ft.	59,827	2,340,978.19	10,031	361,686.00
10. 7 to 8.99 cu. ft.	8,851	623,295.44	1,846	138,810.00
11. 9 to 11.99 cu. ft.	4,955	470,381.20	1,215	109,833.00
12. 12 to 18.00 cu. ft.	4,146	604,409.40	1,125	162,063.00
13. Total Items 1 to 6	18,250	2,320,634.08	12,028	1,626,722.40
14. Total Items 7 to 12	113,426	4,973,404.35	21,166	934,209.00
15. Total Items 13 and 14	131,676	7,294,038.43	33,194	2,560,931.40
16. Separate Systems	81,579	9,181,887.50	21,081	2,498,483.50
17. Separate Low Sides	3,233	68,636.84	11	201.00
18. Total Items 13, 16 and 17	**103,062**	.....	**33,120**	.....
19. Separate High Sides	10,523	514,841.91	89	4,539.20
20. Parts and Miscellaneous	.....	34,339.95	.....	.....
21. Special Equipment	.....	.....	.....	.....
22. Total Household 15, 16, 17, 19, 20 and 21	.....	**$20,703,057.00**	.....	**$8,017,577.00**
23.	.....	.....	.....	.....

COMMERCIAL REFRIGERATORS

24. Water Coolers with High Sides	10,315	1,420,735.76	2,285	310,884.00
25. Water Coolers with No High Sides	.....	.....	.....	.....
26. Ice Cream Cabinets with High Sides	1,048	218,591.40	100	20,100.00
27. Ice Cream Cabinets with No High Sides	365	41,539.79	4	606.00
28. Milk Coolers with No High Sides	.....	.....	.....	.....
29. Room Coolers with No High Sides	3	1,710.00	3	1,710.00
30. Counters and Commercial Boxes	1,473	464,807.00	552	167,235.00
31. Special Equipment	.....	.....	.....	.....
32. Extra Low Sides, Commercial	8,792	291,845.75	812	51,677.50
33. Extra High Sides	3,257	428,872.83	956	176,873.25
34. Parts and Miscellaneous	.....	143,076.72	.....	.....
35. Total Items 24 to 29 and 32	**20,523**	.....	**3,204**	.....
36. Total Items 18 and 35	**123,585**	.....	**36,324**	.....
37. Total Commercial 24 to 34	.....	**$ 5,670,600.00**	.....	**$ 1,773,763.00**
38. Grand Total, 22 and 37	.....	**$26,770,831.00**	.....	**$11,940,600.00**

A Pleasant Way
to handle complaints...

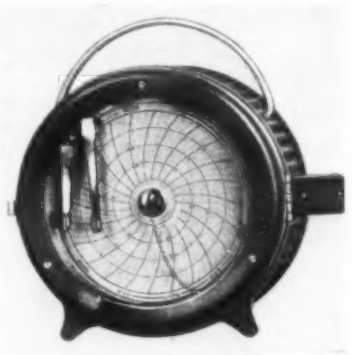
WHEN your service man goes out to investigate a complaint that Mrs. Jones' refrigerator runs too much... doesn't run enough... takes three hours to freeze ice cubes, have him take along a BRISTOL Model 144T Temperature Recorder. It saves long arguments and smooths ruffled feelings.

By leaving this handy little instrument on a shelf of the refrigerator for 24 hours, or 3 days if desired, the service man can present *unbiased* facts on the operation of the refrigerator. One chart shows a continuous record of the temperature in the box, and how often and how long the motor actually runs.

Customers don't argue when complaints are adjusted on the basis of the facts as presented by BRISTOL'S Model 144T. They can see for themselves. Get full information without delay. Send for Leaflet No. 381.

THE BRISTOL COMPANY
WATERBURY CONNECTICUT

Branch Offices: Akron, Birmingham, Boston, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco



BRISTOL'S
TRADE MARK REG. U. S. PAT. OFF.
TIME AND TEMPERATURE RECORDERS *for Refrigerators*

DEALER HAS PARTIES AS SALES PROMOTION

DENVER—Taking advantage of the present popularity among women's clubs of subscription bridge parties, the Household Appliance Co., dealer handling Westinghouse electric refrigerators, has offered the use of its auditorium free for this purpose. The plan is an aid in sales promotion.

W. M. Marshall announces that 26 parties have been booked for the next 13 weeks. The auditorium accommodates 10 tables, and the company furnishes cards, pads, and everything necessary for the game.

In addition, Mrs. W. L. Sells, a Culbertson contract bridge expert, is hired by the company, and gives a 45-minute talk, afterward circulating among the tables to answer questions concerning the play.

After an hour and a quarter, play is stopped and scores are added, signed, handed in. Refreshments are served, and at the same time a 10-minute talk on Westinghouse refrigeration is made.

A prize of an electric iron, warming pad, curling iron, toaster, or waffle iron is given for high score; a $10 certificate applicable on any Westinghouse refrigerator if used within 60 days is given to the woman with high score at each table.

After the party breaks up, salesmen are available to answer questions on the various Westinghouse models in the room; the salesmen have instructions not to press anyone to buy at that time.

"The total cost of each party is approximately $20," reports Mr. Marshall.

TIRE COMPANY AWARDED LEONARD UNIT FRANCHISE

INDIANAPOLIS—Dealer franchises for Leonard electric refrigerators have been established with the Guarantee Tire & Rubber Co. stores, according to the Capital Paper Co., distributor, here.

Six of these stores are located in Indianapolis proper, and four stores in Marion, Muncie, Anderson, and Richmond. The Guarantee Tire & Rubber Co. has handled radios for a number of years.

Other Indiana firms which are now handling Leonard refrigerators under the same distributorship are: Coffing & Robinson, Attica; Sherfey & Kidd Co., Brazil; Westermeier Hardware Co., Columbus; R. E. Harold, Fishers, Whittaker Furniture Co., Franklin; Hatfield Electric Co., Indianapolis.

West Side Furniture Co., Indianapolis; Mt. Jackson Tire & Battery Shop, Indianapolis; Peoples Furniture Co., Jamestown; Maxwell & Persons, Linton; Akers Music Shop, Lebanon, Peoples Furniture Co., Ladoga; Otis Cooksey, Martinsville; Rinehart Radio Sales, Richmond; Peoples Furniture., Roachdale, and General Furniture Co., Terre Haute.

James F. Hall, sales manager of the electrical appliance division with Capital Paper Co., is conducting regional Leonard sales meetings with these new dealer organizations.

WEHLE CHOSEN CHAIRMAN OF BINGHAMTON BUREAU

BINGHAMTON, N. Y.—Edwin C. Wehle, president of the Southern New York Electrical Supply Corp., has been elected chairman of the newly formed association for the promotion of electrical refrigeration here.

Don R. Schively, field representative of the Electric Refrigeration Bureau, assisted in the organization of the association, which will function as a local bureau.

Other officers chosen are: vice chairman, O. I. Livingston, of Livingston-Alvan, Inc., Johnson City; secretary and treasurer, Herbert H. Smith, of Associated Gas & Electric System, Binghamton.

Cities represented were Binghamton, Endicott, Johnson City and Owego in New York, and New Milford, Hallstead, Susquehanna and Montrose in Pennsylvania.

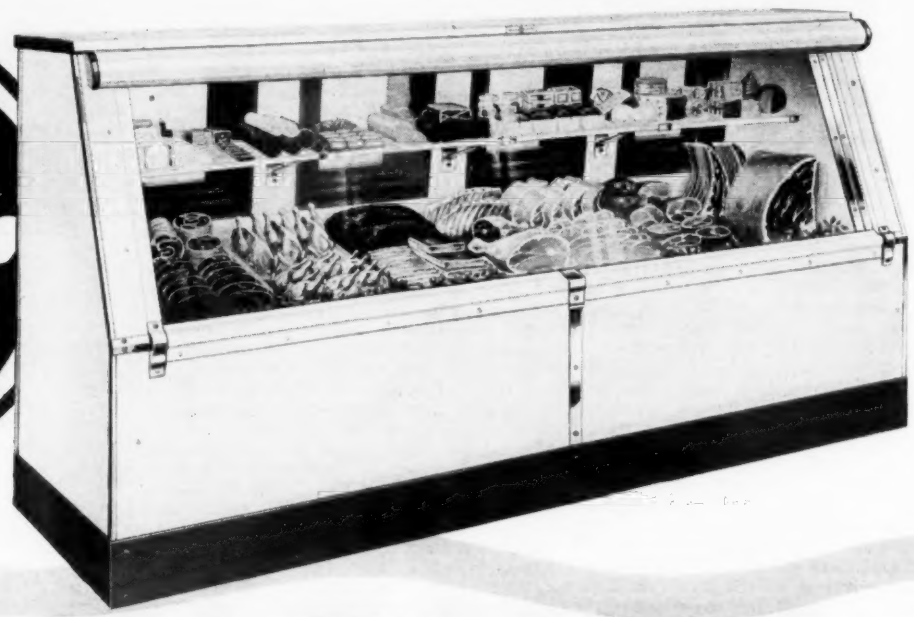
WESTINGHOUSE TO AWARD WINDOW DISPLAY PRIZES

MANSFIELD, Ohio—Prizes for the best window displays using the February display material will be awarded to Westinghouse refrigerator dealers in a contest which begins Feb. 15 and ends March 25.

A first prize of $50, a second of $25, and a third of $15 will be awarded in the contest. In addition, $5 will be given for every photograph of a window display accepted by Westinghouse.

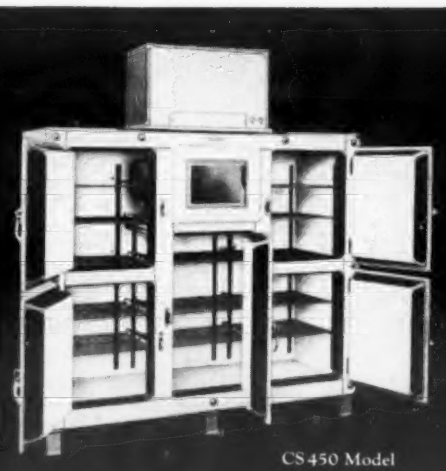
Judges in the contest will be C. E. Allen, vice president of Westinghouse; L. W. Staunton, merchandise advertising manager; and A. L. Billingsley, president, Fuller & Smith & Ross, Inc., advertising agency.

THE GREATEST DEVELOPMENT IN COMMERCIAL REFRIGERATION



CONDITIONED AIR COMMERCIAL REFRIGERATION

costs 25% less to operate



CS-450 Model

KEEPS FRESH FOODS FRESH FOR DAYS
ENDS TRIMMING OF MEATS & VEGETABLES
COOLS FOODS FIVE TIMES AS FAST
COSTS 25% LESS TO OPERATE
NO ODOR TRANSFER

CONDITIONED AIR Commercial Refrigeration . . . General Electric's great new development . . . costs 25% less to operate than any other method of bulk food preservation!

And Conditioned Air Refrigeration does a more complete, more thorough job! *All* the air in the cabinet is washed five times every minute, then circulated by force into every part of the cabinet. Passing over and around foods, it not only cools them *five times faster*, but absolutely eliminates odor or taste transference! Delicate flavor, color and freshness of taste are retained. By keeping fresh foods always fresh, Conditioned Air Refrigeration ends expensive trimming of meats and vegetables. Loss by shrinkage is reduced by more than one-half. It is never necessary to remove foods from Conditioned Air display cases for overnight storage. Within its constant, humid cold, grade "A" foods *remain* grade "A" for days. The scientifically correct ratio of 36°-40° (Fahr.) with relative humidity of 80%-85% is constantly and automatically maintained. Conditioned Air Refrigeration is available in storage cabinets and display cases. All have the famous G-E sealed-in-steel compressor mechanism. Every storage model available for remote installation, or as a "packaged unit". And *every* model carries the written General Electric 3-Year Guarantee against any and every service expense!

General Electric Company, Electric Refrigeration Department, Section DF 21, Hanna Building, 1400 Euclid Avenue, Cleveland, Ohio.

conditioned air

GENERAL ELECTRIC

COMMERCIAL REFRIGERATION

General Electric Declares War on Sales Resistance; Contest Starts

(*Concluded from Page 1, Column 1*)

General Electric refrigerators during 1932.

Particularly stressed was the new General Electric all-electric kitchen which includes refrigerator, range, dishwasher, clock, fan, lights, and other devices. The distributors were told that they were to become merchandisers of electric kitchen appliances, rather than of assorted specialties.

Although plans are still in the formative stage regarding the merchandising of the General Electric kitchen, it now seems likely that General Electric refrigerator distributors will take on the distribution of another major kitchen appliance, the electric dishwasher, along with ranges and refrigerators.

The distributors were warned by Carl Snyder, president of the Walker Dishwasher Corp. (which will make the General Electric dishwasher), that in selling all-electric kitchens they must sell more than just another product; they must "sell a service" to builders—a service which includes kitchen planning, arranging, and harmonizing.

G. E. refrigeration distributors will be cultivating a new market in 1932, Manager P. B. Zimmerman pointed out in opening the meeting Monday morning. This new market consists of families in lower income groups, to which economy, rather than convenience, must be the chief appeal.

Mr. Zimmerman declared that General Electric refrigeration volume in 1931 was approximately the same as that for 1930, which was the best year in the history of the department.

M. F. Mahony, sales manager, told the distributors that they should not be in a hurry to hire salesmen.

Instead of rushing the applicant into the private office, giving him a cigar, and trying to high-pressure him into the organization, the distributor should take an opposite attitude, look the applicant over carefully, and let *him* do the selling, maintained Mr. Mahony.

The selection and training of salesmen is of primary importance in operating a successful distributorship, Mr. Mahony declared.

An elaboration of approved methods of budgeting a distributor operation was presented by B. F. Slye, who observed that "timing" was the key-word to the working of any budget plan.

J. J. Donovan, manager of the apartment house division, next came to bat with one of his 16-cylinder, dual ignition, supercharged sales talks, proving (with a hatful of figures and calculations) to the satisfaction of his hearers that every day without General Electric refrigeration would cost families and apartment house owners more money than they would care to lose.

Concluding the Monday program was a presentation of the new "conditioned air" commercial line by Walter Landmesser, manager of the commercial division, and Chester Lichtenberg of the engineering division at Ft. Wayne, Ind.

"Leave a 10-cent tip for mother after every meal," was the slogan announced by Advertising Manager Walter Daily at the Tuesday morning session. This theme, "10 cents a day buys a General Electric," will be used in forthcoming advertising, Mr. Daily stated.

A major portion of Mr. Daily's talk was spent in an analysis of 25 typical canvass calls, and what they produced. By use of direct mail upon the "duds" found in canvassing, Mr. Daily averred, the number of prospects uncovered could be doubled.

A pair of aphorisms concluded Mr. Daily's talk:

"The plug hat gets the snowballs"; and "Gather ye roses while ye may."

A. M. Sweeney, director of refrigerator production, pointed out that while the General Electric refrigerator was "still basically unchanged," refinements had been made during every year of production.

He unveiled five black-shrouded old models in turn, showing the progressive evolution of the General Electric refrigerator during the last five years.

"The same research men who engineered the original work on G. E. refrigerators are still with us, as are the original designing engineers," said Mr. Sweeney.

"These men have been augmented by younger engineers. Thus the engineering department, as well as the product itself, is still basically unchanged but has been improved by additions."

General Electric has thrown several "bombs" into the refrigeration industry, asserted Chris Steenstrup, designing engineer who is given credit for the major portion of the development of the "monitor top."

The "bombs" he listed included a sealed machine, two-year guarantee, box on legs, sanitary fixtures, one million refrigerators sold in less than four years, and a three-year guarantee.

"Approximately 85 per cent of all public utility outlets sold G. E. refrigerators last year," declared H. H. Bosworth, manager of central station sales. "Their sales averaged $261 per unit."

Of the 4,000 public utility outlets, approximately 90 per cent are in cities of 25,000 or less, and 80 per cent are in cities of 10,000 or less, he pointed out.

After analyzing the "25 plan" from the angle of getting dealers, A. A. H. Uhalt, manager of the dealer division, presented the "4P plan" (product, prospect, presentation, profits), which has as its feature the employment of a roving sales closer to help dealers during the peak selling season.

Next on the program was G. C. Watson, who talked about better transportation facilities, and introduced special delivery truck models.

"Instalment sales totalled 76 per cent of all retail sales made during 1931," stated C. G. Smith, director of sales financing. "This compares with figures of 60 per cent for 1930, 30 per cent for 1929, and 15 per cent for 1928."

While a slight increase in repossessions of refrigerators was noted in 1931, the percentage is still remarkably small when compared with other products, Mr. Smith pointed out. Causes for repossessions were listed by Mr. Smith as follows:

1. Unwarranted credit extension.
2. Changes in the purchaser's economic conditions.
   a. Loss of employment.
   b. Reduction in income.
3. Substandard terms.
   a. No cash down payment.
   b. Irregular payments.
   c. Excessive maturities.
4. Misrepresentation by salesmen.
   a. Agreement to equalize monthly instalments with equivalent purchases from the prospect.
   b. Sharing commission with purchaser.
   c. Exaggerated claims by salesmen.
   d. Miscellaneous unauthorized promises.
5. Payment of salesmen's commission in excess of the purchaser's equity.
6. Failure to give prompt and efficient attention to service.

"Instalment selling will be one of the brightest spots of tomorrow, and will do more than anything else to stimulate the upturn of business. Cash reserves are low and purchases must be made out of income," he concluded.

Some of the problems of the finance company were outlined by H. L. Wynegar of the Commercial Credit Co. The best fortress against repossession, he declared, was the obtainment of the largest possible down payment and the largest possible monthly payments.

In the afternoon the "eastern troupe" of Cleveland headquarters men (one of three groups which are to tour the United States during the next several weeks to dramatize the spring sales drive) did an advance showing of their turn before the critical eyes of the distributors Tuesday afternoon.

Composing the troupe were J. M. Walker, C. O. Hamlin, M. T. Bard, A. O. Anderson, W. E. Hart, and B. F. Slye.

A. L. Scaife talked about the "25 Plan," Jean De Jen presented details of the "Refrigerania War" sales campaign, and Miss Edwina Nolan, home service director of the General Electric Co., discussed the place of home service workers in distributor's operations, to conclude the afternoon session. Miss Nolan announced a correspondence course for home service workers. Her talk will be printed in full in a forthcoming issue of ELECTRIC REFRIGERATION NEWS.

Wednesday was occupied entirely by a presentation of the General Electric Hotpoint range and sales plans for it.

Among the speakers were George A. Hughes, president of the Edison General Electric Appliance Co., T. K. Quinn, vice president of the General Electric Co., Pierre L. Miles, manager of range sales, W. A. Grove, advertising and sales promotion manager, Carl Snyder, president of the Walker Dishwasher Corp., Frances Weedman, F. H. McCormick, M. H. Beekman, director of retail merchandising, and J. R. Poteat, director of distributor operations.

Mr. Grove announced that the combined appropriation for advertising ranges in 1932 would exceed $2,000,000, and that almost every conceivable medium of advertising would be employed.

Miss Weedman conducted a lengthy demonstration of Hotpoint ranges and did everything with them from baking bread to steaming vegetables. A goodly number of distributor's wives were present at this session.

"Hope for business in 1932 is as good or better than it was in 1931," T. K. Quinn, vice president of the General Electric Co., told the distributors in his "Summary."

"Stabilized railroad activity, a new banking credit structure, collective sales activity, and the normal improvement in spring buying can all be counted upon to point business movements upward during coming months," he declared.

Entertainment consisted of a "Gridiron banquet" Monday night, excursions to horse and dog races Monday afternoon and Tuesday night, and spectating at jai alai games Wednesday night.

Contest Details

MIAMI, Fla.—All quotas in the War Campaign will be known as objectives and everyone will be assigned a definite objective in advance. Objectives will be figured in cubic feet of refrigeration, instead of units, as was the custom in previous sales campaigns.

Only new refrigerators sold on a bona fide order and which have been delivered and installed after sunrise, March 14, and before midnight, May 31, will count in the war campaign.

Every General Electric refrigerator sales outlet will be provided with a large colored war map. The number of miles traveled into the enemy's country of Sales Resistance will determine the standing of each participant in the campaign. One thousand miles will be the objective for every participant, from salesman to distributor.

Every participant will be assigned an equalization factor similar to the plan used in the Monitor Top Electric campaign. This plan will give everyone an equal chance to win, regardless of the size of his quota.

Prizes for salesmen will consist of clothing, including a selection of fine suits, hats, shoes, underwear, sox, shirts, and ties. This type of prize is being awarded because the General Electric refrigeration organization believes that before a salesman can sell the products he represents, he must first sell himself—and his appearance, therefore, is of primary importance.

The awards will be based on a point credit system. In other words, each and every sale carries with it a point value in relation to the size of the refrigerator sold. These point values or credits can be exchanged for items of clothing, illustrated in an attractive booklet which will be mailed to every salesman in the land.

The number of cubic feet sold will be the measuring stick in all cases, an arbitrary number of cubic feet having been set on water coolers, ice cream cabinets, milk coolers, and other miscellaneous units according to their equivalent value and the sales effort involved.

All promotions will be made at the end of each week during the campaign period, and made directly by the War department at Cleveland.

For example: All salesmen, whether working for a distributor, central station or dealer, start out as Buck Privates. As soon as a Buck Private attains 25 per cent of his objective (quota) he will be recommended for promotion and receive a commission from the War department authorizing his promotion to Private 1st Class. He will also receive from the War department the proper insigne denoting his rank.

This same procedure will hold true with all other promotions.

Supervisors and contact men in all branches of the Army start out with the commission of Captain. At the end of each week of the campaign, the leading Captain in a Field Army (distributorship) will be recommended to the War department for promotion to Major.

He will then receive a commission to this office, together with the proper insigne denoting his rank. If the Major is not still leading his Division by the end of the following week, he will be demoted back to the office of Captain and he must hand over his commission and insigne of Major to the officer who has supplanted him. The same will hold true in all ranks.

Sales managers start out with the commission of Lt. Colonel. At the end of each week of the campaign, the leading Lt. Colonel in a Field Army (distributorship) will be recommended to the War department for promotion to Colonel.

He will then receive his commission to this office together with the proper insigne denoting his rank.

All central station merchandise managers in a Field Army (distributorship) start out with the commission of Brigadier General. At the end of each week of the campaign, the leading Brigadier General in a Field Army will be commissioned to the office of Major General and receive the proper insigne denoting his rank.

All dealer managers in a Field Army (distributorship) also start out with the commission of Brigadier General and will be promoted or demoted in the same fashion as the officers in the other branches of the Army.

Each distributor starts out with the rank of Lt. General. At the end of each week of the campaign, the leading Lt. General in a Front (district) will be promoted to the office of General, and will receive from the War department a commission to this office, together with the proper insigne denoting his rank.

Each week the leading General in Refrigerania will be commissioned to the high office of Generalissimo.

All wholesale sales managers have been commissioned by the War department to participate in a recruiting campaign from Feb. 1 to March 14, to augment the sales forces by at least 50 per cent, according to an announcement made by P. B. Zimmerman, manager of the electric refrigeration department of the General Electric Co.

The wholesale sales manager who leads all the others in the recruiting campaign will receive a cash award of $500. The second prize will be $300. In addition, there will be an award of $100 in cash to every wholesale sales manager who leads his district, excepting in the district where the wholesale sales manager wins the first or second prize, in which event the second or third best man in the district will win the district prize of $100.

As a great deal of the success in the campaign will rest upon the local campaign manager or Adjutant, special awards will be made to the Adjutants for conspicuous service.

The Adjutant whose commanding officer wins the office of Generalissimo at the end of the war, will be presented with an engraved wrist watch, together with a scroll of recognition.

The new 1932 line of *the famous* ICE-O-MATIC *is ready!*

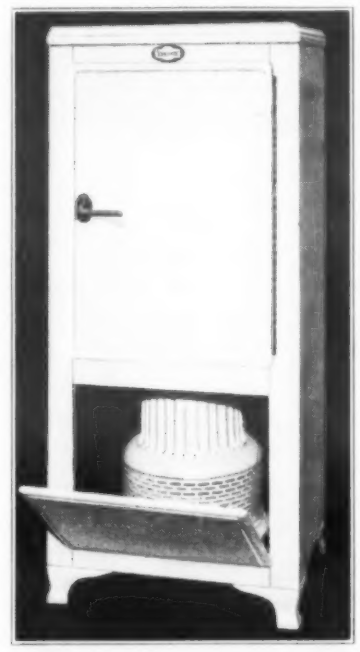
HERE is the finest line of precision-built electrical refrigerators the entire market affords. *Built*—not just assembled—by the makers of the world-famous Williams Oil-O-Matic oil burners, these new 1932 Ice-O-Matic models offer an array of 15 quality features which give you a definite "edge" in any sales situation.

Ice-O-Matic is the most flexible line of electric refrigerators in America. There is a size and a type of Ice-O-Matic for every refrigeration need, commercial as well as domestic.

Ice-O-Matic precision manufacture and rigid requirements as to materials are jointly responsible for a record of phenomenally low service costs, over the years.

There is good Ice-O-Matic territory available—perhaps yours. The coupon will bring you full information on the money-making opportunity with Ice-O-Matic. Send today.

1 Greater cooling capacity—using less electric current.
2 Quiet operation—and no radio interference.
3 Large food space, conveniently arranged.
4 Eye level temperature control for faster freezing.
5 Sealed unit on top or below.
6 Furniture designed cabinets of finer quality.
7 Plugs into light socket simply as a lamp.
8 Extra heavy insulation.
9 "Acid proof" porcelain, easily cleaned.
10 Concealed automatic door latch.
11 Easily sliding shelf bars.
12 Chromium finished hardware—full length piano hinge.
13 Forced air circulation.
14 Generous ice cube capacity.
15 Built the Williams way—materials of quality, superiority of workmanship.



Tested and Approved by Good Housekeeping Institute — Conducted by Good Housekeeping Magazine

WILLIAMS ICE-O-MATIC REFRIGERATION

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
Send me complete information on your exclusive, full-profit Ice-O-Matic dealer franchise for my territory—right now!

Name .....
Address .....
City ..... State .....

Read this ANNOUNCEMENT to your WIFE

1914 1932

YOU may already be in the electric refrigeration business. Or, you may be looking around for the *right* Franchise. Regardless, read this announcement to your wife. Women know values. They are smart buyers. And, they know *salable merchandise.*

In 18 years, Kelvinator has never built a finer electric refrigerator *at the price* than the new, *low-priced* "K" Model. It represents all Kelvinator has learned in engineering, in designing and in manufacturing during 18 long, successful years devoted entirely to electric refrigeration. And experience *does count*—as many electric refrigeration dealers are *finding out.*

Look again at the illustration of the four foot job. It *is* beautiful. And beauty *is important* because women have a natural eye for and an appreciation of beauty. So have the men, for that matter, but in an electric refrigerator they place economy and performance ahead of beautiful lines.

Study it carefully. Notice the flat top—the thickness of the door—the scientific arrangement of the shelves—the chrome tray fronts—the all-porcelain cooling unit—the Temperature Control, with 8 different freezing speeds—the rounded corners of the porcelain interior and, the harmonious lines of the cabinet as a whole.

There are 4 different sizes—4, 5, 6 and 7 cubic feet food storage capacity and two different finishes—porcelain inside and out or porcelain interior and snow-white lacquer exterior. This makes 8 Models—a Model for 85% of the people who will buy electric refrigerators in 1932.

There are many other points of interest to prospective dealers—points about the "K" Line—about the new medium-priced Standard Line—about the new De Luxe Line, the finest money can buy—about the complete Kelvinator Commercial Line—and about the big Kelvinator Program for 1932, that we shall be glad to discuss with responsible merchants. Wire, write or phone to-day.

KELVINATOR CORPORATION, 14245 Plymouth Road, Detroit, Michigan
Kelvinator of Canada, Ltd., London, Ontario • Kelvinator Limited, London, England

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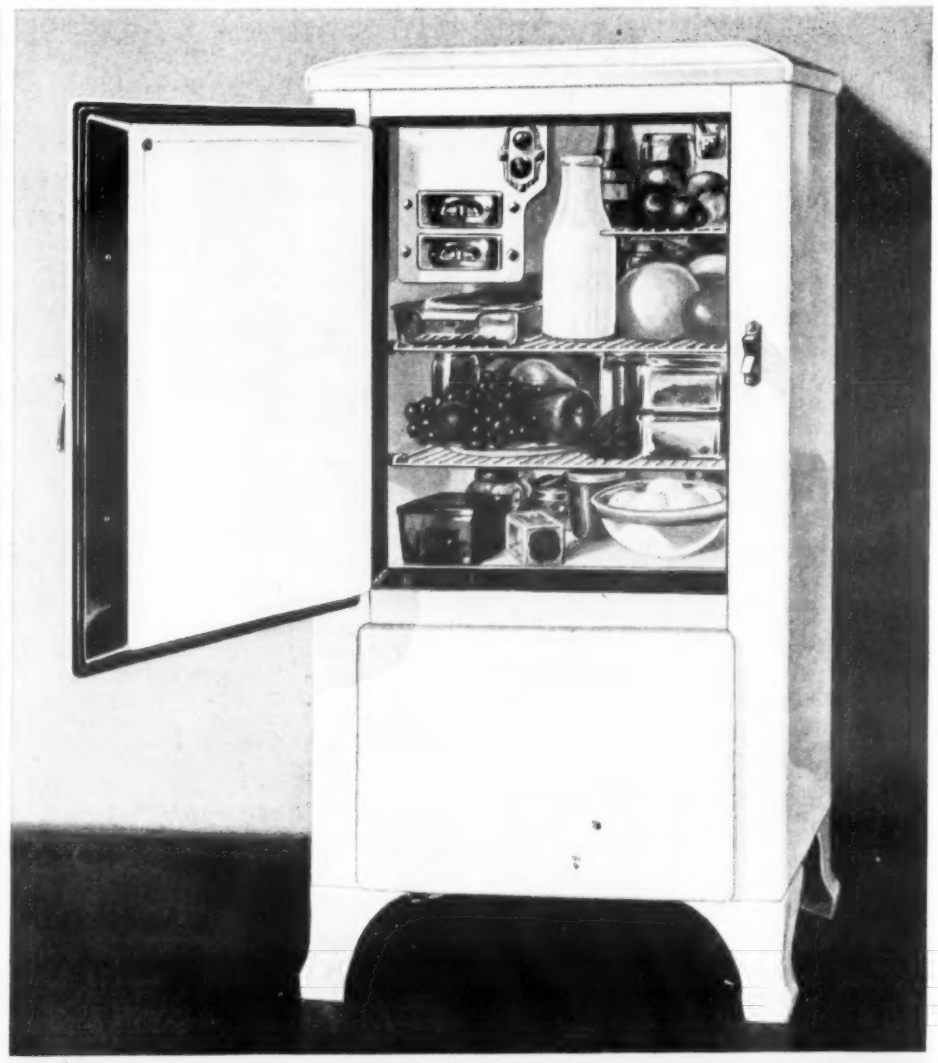

Kelvinator

MERCHANDISING SECTION ELECTRIC REFRIGERATION NEWS

The Business Newspaper of the Refrigeration Industry

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Who Will Get the Business In 1932?

WHO is going to get the profitable share of the electric refrigeration business in 1932? There is a question for you. Aside from predicting that a lot of lead pencils will be worn out by people who are trying to figure out the answer, we intend to refrain from making any forecasts at present. Right now, we are still trying to master the complexities of the Nema statistics plus the confidential returns from other manufacturers and the scraps of unrelated data obtained from a variety of other sources. Our enthusiasm over the availability of some real statistical information is tempered by the near-headache brought on by attempts to decipher its meaning.

Although we cannot discuss the figures of individual companies (we do not have those of the Nema group and the others were received in confidence), some conclusions may be drawn from the totals by anyone who is familiar with the activities of the various companies. The fact that the Nema data is separated from the industry totals, makes it possible to do some guessing regarding the trend of affairs.

Household Sales Show Gain

Real encouragement for the future of household sales is given by the 1931 figures which show a substantial gain (802,356 compared with 707,050 in 1930), an increase of 95,306 household units for the Nema group. The value of this household equipment at factory prices was $103,150,686 in 1931 against $93,854,989 in 1930. Since retail prices, including transportation and installation charges, are approximately double the factory value, the figures indicate that the Nema companies and their dealers booked orders in 1931 amounting to 18½ million dollars more than their 1930 sales of household refrigerators.

Who Got It in 1931?

Looking at that 95,306 gain in household unit sales, one cannot help but speculate as to how it was divided among the Nema manufacturers. If one is to believe the reports of increased business secured last year by several of the Nema companies, then the question arises as to whether the others failed to gain or even suffered a loss.

Also taking into consideration the substantial sales made by companies not in the association (totalling 162,644), it would appear that some of the smaller and younger manufacturers had their innings in 1931. Whatever the figures mean, it seems clear that the newcomers in the field have a chance and that the competitive battle isn't over by a long shot.

The Price Question

Since relatively little complaint was heard about price cutting last year (although everybody was looking for it to break loose during the second half) and since the market saturation is still low, perhaps one lesson to be gathered from the figures is that the time has not yet arrived for any drastic reduction in prices.

Present indications are that the "$100.00 refrigerator" is going to be in the limelight again this year. The industry had a "$100.00 scare" in 1929 when there were widespread reports that Majestic would bring out a unit at that price. When the Majestic unit finally appeared in the fall, the prices were in line with the established values, but several of the manufacturers had anticipated the competition by announcing a new cheap line. Apparently there was no great demand for the cheap models and prices moved upward. Last year the tendency was to improve the product, rather than lower the price, and the fact that 1931 sales jumped up would seem to indicate that the quality idea was correct.

It remains to be seen whether low price will be effective as a sales appeal in 1932. It may be well to keep in mind that the electric refrigerator has become "economy merchandise" in that it produces savings to offset its cost. Considering the easy payment terms now in vogue, the question of price comes down to this: Does the American public prefer to make a few more payments and get a better refrigerator?

GLEANINGS
FROM RECENT PERIODICALS

"BUSINESS WEEK" COMMENTS ON THE SLOT MACHINE AS A SALES DEVICE

MERCHANDISERS of mechanically-operated refrigerators are alarmed over the increasing tendency of some distributors and dealers to maintain abnormally high sales volume by dangerous artificial stimulation.

Refrigerators for home use average over $200 each. Excepting a motor car, or piano, they probably represent the householder's largest single-unit investment; when sold on instalments, the largest commitment.

During the first nine months of the industry's 1931 million-unit sales drive, sound terms were maintained. Approach of colder weather—the ordinary "off" season for refrigerator sales—caused distributors, dealers, and salesmen to seek methods of holding waning interest, cashing in on prospect lists, moving balance of sales quota.

Some dealers offered refrigerators for a small down payment, and to help buyers through the holiday strain on funds, scheduled the first instalment due in March, 1932. Others offered delivery of the selected unit at once with no payment until March-April, 1932. Prospective purchasers found terms the more frequently used sales argument with mechanical superiority or quality a secondary consideration.

Almost throughout the industry, smaller down payments are accepted, monthly payments reduced, until instalment terms previously insuring completion in one and one-half years now often extend well into the second year.

Dealers, intent on maintaining sales volume with some safety, are employing recently perfected current control devices, which will operate only when a quarter is dropped in a slot every 24 hours.

These are separate units carrying time switches which automatically cut service if daily payment fails. The necessary monthly collection from these devices gives dealers opportunity for definite check on purchaser's performance.

When payment is completed, the control device—property of the dealer—is removed for repeat use and purchaser gets bill of sale.

Mills Novelty Co. sells a combination quarter-in-slot coin device and clock at $16.50 which has been adopted by many dealers and helped some department stores move a record-breaking number of units into homes.

Meter-ice of America Co., Ltd., has had remarkable success selling its Meter-ice device to some department stores, utilities, large distributors. Made by Warren Telechron Division of General Electric Co., the device contains the usual time switch, an exclusive self-starting feature, insures the user of the refrigerator continuous service if a daily 25-cent deposit (or up to 11 quarters at once) is made. Since starting production in June, 1931, the company has sold 18,000 units and 1932 schedules call for eventual weekly output of 5,000, total of 250,000 for the year.

Some refrigerator manufacturers urge upon dealers the use of the device and at least one manufacturer is under way with a national campaign to build volume through use of the Meter-ice plan.

Companies organized to finance instalment sales are divided as to the soundness of this type of selling.

One nationally operating company, closely affiliated with one of the largest refrigerator manufacturers, now carries contracts covering coin operated units.

The Bankers-Commercial Security Co., Inc., has a special financing plan for Meter-ice sales.

Some department stores have arranged for financing such sales within their organization.

One of the largest financing institutions in existence at present refuses to handle any contracts not showing a substantial deposit by purchaser and providing for termination at least within 18 months.

They agree with the more conservative manufacturers and dealers that since, according to *Electrical Merchandising*, 80 per cent of all wired homes are still without electric refrigerators, there is as yet no excuse for dangerous selling practices.

They insist that at 25 cents per day, $7.50 a month, purchasers are likely to consider the venture merely another means of buying "ice," because there is little accumulating equity beyond what would be current expense. In the race between actual ownership and obsolescence, the latter may win, dealers be left with a flock of second-hand machines, unfulfilled contracts, serious losses.

One finance company executive described the present wave of term selling as a case of hunger rather than judgment, stated that his company would under no circumstances finance such operation until sufficient experience had been gained to prove the soundness of no-deposit, or quarter-a-day selling of an appliance involving so great a dealer investment.—*Business Week*, Jan. 20.

How To Sell Refrigerators
As Told By W. J. Laperouse, Frigidaire Quota Buster

By Gertrude Stanton

DAYTON—"I am not a high-powered salesman," said W. J. Laperouse, Frigidaire commercial salesman from Galveston, Tex., in explaining the tactics which won him a trip to the Frigidaire B.t.u. Quota Club Congress, here, last week.

"In my territory you must work with the prospect gradually, and sell yourself before you even begin to mention Frigidaire."

Mr. Laperouse explained that in Galveston many of the storekeepers are of foreign birth, particularly Italian.

"They not only own the store, but wait on trade, along with the rest of their family," he explained. "They are always busy, and a salesman must just bide his time.

"You can't make an appointment with them," he continues. "Part of their business tactics is to refuse a definite appointment. You cannot say to an Italian storekeeper, 'Now may I come in to talk Frigidaire equipment to you at 2 o'clock this afternoon?' because he will say 'No.'"

Instead, Mr. Laperouse will drop into the store for 10 or 15 minutes, chat a little if the proprietor is not particularly busy, or, if he is, just nod pleasantly to him. Maybe he will mention Frigidaire, and maybe not. The next day he will come in again, perhaps, until he has made friends with his prospective customer.

Finally, when he decides that enough interest has been aroused for him to talk business, he'll say, casually, "Well, I'll come around and see you tomorrow afternoon."

He is, in other words, inviting himself, and the prospect is too courteous to refuse him. Even when he talks Frigidaire to a man, he does not try to "sell" the equipment, he says, but only explains its merits, sometimes even seeming slow to tell about it, so that the prospect will ask questions himself.

"Many a time," he reports, "I've had a man say to me, 'Well, Lap, when you came in that door I would have bet a hundred dollars you couldn't sell me on this,' and I would reply, 'I didn't sell it to you; you just decided you wanted to buy.'"

Mr. Laperouse has been a Southerner all his life, coming originally from Louisiana, but he has lived in Galveston for 17 years, and knows its people. He is well enough known so that many of his prospects know him as "Lap" before he comes around to talk business with him.

He laughs as he confesses that during all those years in Galveston before coming with Frigidaire, he was interested in ice refrigeration.

Not only was this his first trip Quota Club Congress, but it was his first trip North at all, and he scolded vigorously because Dayton was not snowed under so that he could see a really heavy snow. He planned to take a little trip through Chicago and as far West as Sioux City, Iowa, however, and was assured that he would probably strike snow before he turned south again.

There is a kindly air about Mr. Laperouse, the air of a man who has a great many close friends, and when he explains that a prospect must trust the salesman and like him personally before he will buy, it is apparent how much this manner has to do with his successful sales record.

Although Mr. Laperouse is primarily a commercial salesman, he also sells a little household business during the year, and describes one of his most interesting sales in this field.

A man and his wife were in the market for an electric refrigerator, and were in a deadlock; the man favored Frigidaire, and the woman another make. Mr. Laperouse called on her several times, but she stuck to her guns.

Finally one night when Mr. Laperouse was "on the floor," he called and asked her if she would come down to the showroom. She promised to, but did not appear. The next night he called her again, and she gave in.

Appearing with her husband she laughed and said, "Well, here I am, but what good will it do you?"

Mr. Laperouse replied, "We'll see," and began to show her the various models on the floor. He told her the qualifications of them and within a half hour after she had entered the display room she said to her husband:

"You win. I like this one, and I think we'd better buy it."

"Was that your hardest sale, Mr. Laperouse?"

He sat and thought for several minutes. "I can't think of any very hard sales right now," he said. "Maybe if you'd give me time, but I couldn't tell you what my hardest sale was."

50 ELMIRA DEALERS FORM REFRIGERATION BUREAU

ELMIRA, N. Y.—Plans for the formation of an Electric Refrigeration Bureau here recently culminated in an organization meeting held at the Mark Twain Hotel, which was attended by 50 dealers' representatives.

Election of the following officers took place: chairman, Charles Wright, Wright Electric Co.; secretary and treasurer, T. S. Craig, Elmira Water, Light & Railroad Co.; D. K. Davis, also of the latter company, was named advertising manager.

The following towns, in addition to Elmira, were represented: Corning, Bath, Watkins, Horseheads and Addison in New York, and Athens, Towanda, Sayre and Troy in Pennsylvania.

C. R. Rudy, of Associated Gas & Electric System, presided at the organization meeting which was addressed by Don R. Schively, field representative of the Electric Refrigeration Bureau.

ALLEN-INGRAHAM STARTS RANCH OF QUOTA BUSTERS

NEW YORK CITY—Allen-Ingraham, Inc., New York distributor for Westinghouse electric refrigerators, has announced the formation of the A-1 Ranch as a means of tying in their salesmen's efforts throughout the year with the newly organized national Circle W Quota Busters Club.

The new "ranch" supersedes the "Ancient and Honorable Order of Industrious Honey Wasps" which was the name of their salesmen's organization previously.

In a telegram sent to Westinghouse officials at Mansfield, Willard Hall of Allen-ingraham said: "Have heard rumors of mass organization by other ranches to destroy the red evil of sales resistance and issue challenge at this time that the A-1 boys will finish at the top of the final roundup."

TOBIN APPOINTED SALES PROMOTION MANAGER

LOS ANGELES—Thomas J. Tobin, formerly of the sales promotion department of Harper-Meggee Co. in the northwest, has joined the organization of Kierulff & Ravenscroft, Inc., Mayflower distributor here.

Mr. Tobin's duties will be those of holding regional dealer sales meetings, and of handling sales promotional work in the entire territory.

Letters from Readers

No Middle Ground In Refrigeration

The Harry Alter Co.
340 N. Dearborn St.
Chicago, Ill.
Jan. 27, 1932.

Editor:

When a man buys a cheap pair of pants and pays $1.95 for them, very likely they will give him his money's worth. They may not look so hot, they may even bag at the knees so that he will look like he is about to take off from a high jump. They may polish up nice and shiny, but when it is all said and done, they will cover his torso adequately and represent full value to him at $1.95.

If a woman needs a pair of hose and cannot afford sheer silk, she might buy cotton hose at 19 cents and lose her sex and sox appeal, but she gets 19 cents worth, that is a cinch.

If either she or the man who bought the pants in the first paragraph wanted to spend more money they could very easily have found a merchant who would give them better quality for more cash. In the case of the stockings, for every few cents more that she spent she would get that much more value for her money. The man buying the pants could spend $4.00 and get a pair that would not shine as fast perhaps—at $6.00 they would not shrink and at $7.00 they would hold their press and be the latest word in cut and style.

What has all this to do with electric refrigeration? Simply this: *there is no middle ground in refrigeration quality.* An electric refrigerator either does or does not work, and if the blamed thing will not work it is not worth a plugged nickel.

"Work" means holding the food chamber at a constant temperature of between 40 and 45°. To do that you must have good insulation and an efficient refrigerating system.

If you cannot hold the temperature in the electric refrigerator below 50° you might just as well have an old style ice box. You see, therefore, there is no middle ground. It is either cold or not cold. A refrigerator either works or does not.

So, the boys who are rushing to market with $99.50 prices and less may have electric refrigeration, but my honest opinion is that more than likely most of them will have just ice boxes with no room for ice.

HARRY ALTER,
President.

POST-MORTEMS of 1937

"Five hard years taught me that lesson"

"Believe it or not, Joe, I've had four jobs selling refrigerators in the last five years. Three of the companies went bust; once I got fired. But I sure learned one lesson. Over the long haul, it's the company that puts out a good job that stays in business and pays good money.

"I found one of my old sales manuals the other day from 1932. There was 28 important electric refrigerator manufacturers listed. Not more'n ten of 'em is in business today. There's certainly—"

"Yeah, but it wasn't sales competition that put 'em out of business. It was poor refrigerators. Cutting corners. Tryin' to save a nickel here and a few cents there which meant cutting quality. They began to get a bad reputation."

"Right! And I'm through working for people who have money and pep and advertising but who can't see business two—three—five years ahead."

"Here's my slant, old man—in the long run the salesman—any salesman—can only make money on a product that has quality for the money. The boss showed the gang just the other day that every fifth sale is made to someone who had our refrigerator recommended by one of our customers. Tie that if you can."

This is typical salesman talk of 1937. It will be based on hindsight—always more obvious, more certain, than foresight. But astute refrigerator manufacturers have already seen this handwriting on the wall. They know that to establish the kind of reputation that will see them safely over the rocky road of present economic conditions requires quality motors, compressors, coils; quality parts and workmanship throughout. And all these things **conserved by quality insulation.**

That is one reason why refrigerator engineers are specifying Dry-Zero Pliable Slab insulation. They know its constant dependability will add a vital quality to the refrigerator. Dry-Zero Corporation, Merchandise Mart, Chicago, Illinois—Canadian Office—465 Parliament Street, Toronto.

Facts about Dry-Zero

Dry-Zero is made from the fibres of the huge seed pods of the Ceiba tree, growing in Java and the South Sea Islands. Nature designed these fibres to carry seeds for long distances through humid air and tropical showers. To do this, it was necessary that they be light and completely resistant to moisture.

By an ingenious process of "graining," the fibres are laid parallel with each other, and at right angles to the line of heat flow. This results in greatly increasing the resistance to heat movement through the minutely uniform batt thus formed.

For use in refrigerators, the Dry-Zero batt is placed in treated fibre-board containers made exactly to fit a specified position in the refrigerator. These sizes are carefully checked by templates to assure perfect fitting, although the flexibility of the slab allows for common irregularities of cabinet construction.

The slabs are completely wrapped in a special Kraft paper, which has been thoroughly coated with an asphalt made specifically for Dry-Zero and rolled on under heat and pressure. This results in the Dry-Zero Sealed Slab, which has the most perfect vapor seal that has been developed in the insulation industry.

Where cabinet construction permits, the outer Dry-Zero sealing sheet extends beyond all sides of the slab, providing the exclusive vapor tight sealing flange.

The U. S. Bureau of Standards has published the conductivities of various insulating materials. In this table, the efficiency of Dry-Zero insulation is found to be from 12% to 40% higher than the other refrigerator insulating materials. Bear in mind that these figures are authentic and not the claims of manufacturers.

In other tests, for moisture absorption, notably by Prof. Miller of the University of Minnesota, Dry-Zero has been shown to absorb a far smaller quantity of moisture than any of the other leading materials. Further, as moisture will inevitably penetrate any refrigerator wall in time, it is well to know that it will have practically no effect on Dry-Zero, which is unique in this respect.

Its use in thousands of domestic refrigerators, ice cream cabinets, solid CO_2 containers, railroad refrigerator cars and refrigerated trucks over a long period has proved beyond doubt the permanence and dependability of Dry-Zero.

THE MOST EFFICIENT COMMERCIAL INSULANT KNOWN

DRY·ZERO

LITTLE STORIES OF INTERESTING PEOPLE IN THE REFRIGERATION INDUSTRY

THE EXPANSION VALVE

LITTLE STORIES OF INTERESTING IDEAS IN THE REFRIGERATION INDUSTRY

By George F. Taubeneck

Supreme Hoax

It was a glum assembly of distributors who greeted Walter Daily, advertising and sales promotion manager of the General Electric refrigeration department, at the Tuesday morning session of that organization's "25 Plan" convention at Coral Gables, Fla.

The announcement had just been made that executives of the General Electric Co. had decided that the name, "General Electric," could no longer be used on the G. E. refrigerator.

So Walter was bravely trying to show his downcast audience some specimen advertisements for the "Supreme" electric refrigerator, as they had decided to call it. "New in name only," was the slogan of these advertisements. Headlines all employed the word "supreme" in some manner, such as "supreme value."

These advertisements were for use by the distributors, for the powers on high were said to have decided that since the General Electric name was no longer to be used, national advertising could be dispensed with. Lou Maxon, head of the advertising agency which has the G. E. account, had been told his services would no longer be needed.

It was suggested that the distributor could call the refrigerator by their own names. Thus, around Chicago it would be the "Cooper" electric refrigerator, in Washington the "Laidley," and in Michigan the "Caswell."

Gloom became so thick that a group which tried to enter one door could advance but a yard or so before giving up and returning to the sunlight; and a man behind me, who had just awakened from a comfortable snooze, wondered audibly what was the matter with the motion picture projector—he could hear a voice but couldn't see anything.

And then Manager Zimmerman chased the blues away by reading a supposed telegram from Gerard Swope, president of the General Electric Co., declaring that it was all a mistake, and that they could continue to call it the General Electric refrigerator.

It was a good hoax.

* * *

Superb Playboys

Whatever else the General Electric refrigerator distributors may be, they are undoubtedly the most efficient playboys—as a group—in the industry. When these boys make merry, it is done with an abandon and a verve which would make Robin Hood's gang seem like the Fourteenth Avenue Literary and New Thought Club.

They are young, they are successful, they make money and spend money, they work hard and play hard. Theirs is a tremendous vitality, a spontaneous gaiety, a tenacious modernity, and a wholehearted fraternity.

No stiffness, no sense of a "dignity in keeping with one's position," no fear of what others will think. What they want, they get; and what they want to do, they do.

Most of them spend money easily.

* * *

Some of the Boys

As Exhibit A of the G. E. Playboy we nominate Phil Harrison, robust young distributor from Newark, N. J. Phil's vitality and exuberance exude from every pore. Whatever the game is, Phil plays it as if life itself was the stake.

"You can call me anything but 'sissy,'" he says.

Exhibit B is Art Dunning of Duluth, Minn., who was inaugurated President of Refrigerania at the convention. Art in tall, languorous, long-faced, lugubriously comic. His inaugural address was a scream. So was his toastmastering at the Gridiron banquet Monday night.

Tuesday night Art and the Valve betook ourselves to a Miami night club. The band played a tuneful ballad, and Art sang it lightly. Recognizing real vocal talent, the master of ceremonies asked him to sing to everybody.

Was he daunted or embarrassed, even as you and I? Heh. He not only sang the song (drawing the biggest applause of the evening), but took over the job of master of ceremonies, led the band, called for "big hands" for the entertainers, sang a few more numbers, and did it all with such consummate grace and ease that the hired master of ceremonies—seated helplessly at a table—wished he had never thought of his smart idea to spotlight the president of Refrigerania.

The floor show concluded, and the remainder of the crowd settled down to the more serious business of dancing and drinking. Art was ready to go home. No more entertaining to be done, no more chance for clowning. So back to the hotel we went.

* * *

Mingling with Elite

At home, distributors of General Electric refrigerators may belong to local 400's. Our own private opinion is that most of them are too busy to make great social successes of themselves. Be that as it may, they all had a chance to mingle with many of the nation's elite Tuesday night.

The occasion was a charity dog race—80 greyhounds—run at the Wayne Kennel Club. Among those who bought boxes (at $100 per) for these races were Lee Shubert, Roger Firestone, Gar Wood, Joseph E. Widener, and J. H Carstairs.

On the entertainment committee were Lee Shubert, Lawrence Schwab, Haskell Coffin, Nunnally Johnson, and H. N. Swanson. The women's committee included Mrs. James J. Walker, Mrs. Elliot F. Shephard, and Mrs. L. M. Tobin.

Entertainers included Helen Morgan of the Ziegfeld Follies, Walter Kelly ("the Virginia Judge"), Al B. White of RKO, Frank Ford, Chic Endor and Charles Farrell. Also the dogs.

* * *

Voice of George Patterson

"This is the voice of George Patterson, sending you welcoming greetings and wishing you joy during your stay. The new General Electric line," etc.

Inasmuch as these words were coming from an airplane several thousand feet overhead, the distributors, gathered on one of the big balconies of the Miami Biltmore, were forced to believe that George had a pretty big voice.

The announcer (not George Patterson, but one of his men) was speaking with the aid of General Electric amplification equipment which, its makers claim, will broadcast the human voice for a distance of five miles.

It was a neat stunt.

* * *

George Hughes & Co.

If ever anyone deserved the title of "Grand Old Man," it is George Hughes, president of the Edison General Electric Appliance Co., and the instigator of the big drive on electric ranges now getting under way.

Mr. Hughes is massive, portly, and benevolent in appearance; weighty in word and manner, he is still a kindly, interested, agreeable gentleman who attracts loyalty, respect, and affection.

His lieutenants are young men who have grown up in the industry and under his tutelage, and who furnish the steam for Hotpoint locomotion.

Mr. Hughes has his hand on the throttle, and is himself largely responsible for the construction of the tracks, stations, and block signals.

Pierre Miles, who heads range sales, grew up alongside of many of the present General Electric refrigeration executive staff when, as a youth, he worked for the Cleveland Electric Illuminating Co.

Art Grove, advertising and sales promotion manager, is dark, clean-cut, aggressive, and wired for high frequency. He meets people well, and leaves a good first impression. His presentation of Hotpoint range advertising plans before the distributors was a matter of life-and-death importance to him; and until he had made his speech and demonstration—it was late on the last afternoon of the convention—he didn't relax for an instant.

Carl Snyder, president of the Walker Dishwasher Corp. (which will make the General Electric dishwasher) is young, dynamic, and a good greeter.

Mr. Snyder's passion is the all-electric kitchen. He found that to sell an electric dishwasher he had to sell a complete electric kitchen to builders, and that to sell a complete electric kitchen he had to sell a designing service.

And that is his particular message to distributors who may undertake to handle dishwashers:

Don't try to sell dishwashers as just another product. Help the builder design a time-and-trouble-saving kitchen, a kitchen which is a model for beauty and harmony as well as efficiency. And when the order comes, it will be as much for service rendered as for sales ability or demand for your products.

Cabinet Member

K. A. CONNELLY

G. E. distributor in Billings, Mont., and a member of Refrigerania's cabinet.

Kenneth A. Connelly

Secretary of Commerce of Refrigerania is Kenneth A. Connelly of the F. B. Connelly Co., Billings, Mont. Inasmuch as Herbert Hoover moved from Secretary of Commerce to President, it might not be amiss to keep an eye on Mr. Connelly during the next Refrigerania election.

Mr. Connelly is as modest as the proverbial Carnegie Medal hero. He is tall, dark, anxious to please, sincere and well-mannered.

His territory embraces approximately 235,000 square miles—a distance equivalent in size to the combined area of the states of New York, Maine, New Hampshire, Vermont, Connecticut, Massachusetts, Rhode Island, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and West Virginia.

Wired homes in this area, however, number only 255,000, in 186 communities.

Especially enthusiastic was Mr. Connelly about the Monitor Top Election Campaign, which he thought particularly commendable because of the opportunity for recognition it gave to practically every man in his sales organization.

He conducted three big rallies during the contest.

* * *

Display Rooms on Wheels

A considerable number of traveling display rooms have been reported in the columns of ELECTRIC REFRIGERATION NEWS during the last few months. The idea of taking a showroom to the prospect seems to appeal to a number of manufacturers and distributors, as well as dealers.

At the "25 Plan" convention was shown an "aerocar," manufactured by the Curtiss Airplane Co. This "aerocar" is simply a trailer, built something like the cabin of a large passenger transport plane, in which can be placed several models of household electric refrigerators, a water cooler or two, and an electric range.

A bus something similar to this was exhibited at the Copeland convention. In the humble opinion of your correspondent, this showroom on wheels idea seems to have considerable merit.

* * *

Ideal Spot

Although it cost each individual who went plenty of money, the Miami Biltmore at Coral Gables is almost an ideal spot for a convention.

In many respects it has points of similarity with French Lick, where the Norge distributors' convention was held. It is localized, for instance, and isolated. Almost the only way to get into Miami proper is by taxi, which costs the neat little sum of $4.00 each way.

Everything one needs is right there is this magnificant hotel. Just outside is an excellent golf course. There is a beautiful outdoor swimming pool. Dancing afternoon and evening. Miniature golf. Bridge. Regular country club, in fact.

And a basement arcade of shops.

Add to this the blooming Florida weather—not too hot, but warm enough for real comfort—and the colorful Spanish architecture of the hotel and the adjacent Coral Gables homes (one of which belongs to George Hughes), and you have a very happy setting, indeed.

Good meals, too. Here, for instance is the menu which confronted us at the Gridiron banquet:

Shrimp Cocktail
Green Turtle Soup, Amontillado
Celery Salted Nuts Queen Olives
Filet of Red Snapper, Duglere
Saratoga Chips
Breast of Chicken, Chasseur
String Beans, Maitre d'Hotel
Potato Chateau
Pate de Foie Gras, in Aspic
Heart of Lettuce, Roquefort Dressing
Saltine Crackers
Fresh Strawberry Ice Cream
Mignardises
Demi-tasse

* * *

Notes of an Editor's Assistant

(With Apologies to Walter Winchell)

Dear George:

We received your card showing the surf at Miami beach . . . just as we were about to shovel our way out of the house after the first real blizzard of the year . . . the U. S. mails prevent me from setting forth the comments made . . .

The *Chicago Tribune* reprinted your editorial, "It's the Bunk," which dealt with the report of the refrigeration subcommittee of President Hoover's Conference on Home Building and Home Ownership . . . it must have made a hit with the newspaper editors, for the editor of the *Detroit Times* sent a messenger for a copy of the issue containing said editorial . . . they haven't used it yet, however . . .

We're still getting some nice responses on the way in which we handled the F-12 report . . . a new subscriber states that the publication of the report "prompted me to subscribe" . . .

Ed Terhune writes from Boston . . . invites you to attend the Copeland regional convention there Feb. 17 . . . says he wants you to speak at the banquet on any subject you care to choose . . . states that he won't take "no" for an answer . . . promises that he won't take you "over the bumps" again or "in any way ensnare you into the Hoosegow" . . . will you go or are you afraid that the Boston "bulls" might recognize you? . . .

The Faraday men sent you a nice leather kit for keeping papers and other materials . . . has a zipper arrangement 'n' everything . . . accompanying letter says it was promised you at the meeting at which the Faraday refrigerator was announced . . .

You have a letter, evidently from Kay, but no apples . . . when do we get apples again? . . . do we have to wait until the middle of summer, or when is the apple season in southern Illinois? . . .

How do you like the Gibson picture on this page? . . . knowing your pash for chorus girls and models, we rushed it through for this issue . . . you'll have these publicity men trained as to good pictures yet . . .

Your car runs again . . . the bill of repairs covered two pages . . . ought to last for another year now, or at least until the stock market gets better . . . please remit $25 . . .

We are all very anxious to hear the details of your trip to a Miami night club with the President of Refrigerania . . . sounds very interesting . . . better watch out, somebody is liable to hear your impromptu singing with some of these well-known bands and sign you up as another Bing Crosby . . . it's not impossible, under certain conditions there are some people who even like your violin playing . . .

Don Compton wrote for three extra copies of the issue in which appears your Valve sketch of him . . . says his offspring enjoyed it very much . . .

The picture you requested from Paul Jones has arrived . . . he says that if things weren't so rushing around the Servel factory right now, he would send more dope along with it . . . promises to send something in the near future . . .

Cranston-Thomas is somewhat perturbed over the way we handled some of his copy . . . he also says that he is still waiting to meet you with the band and the keys to the city should you decide to go to the South Florida fair at Tampa . . . maybe the Chamber of Commerce is anxious that their city get a write-up via your Editor on Wheels . . .

By the way, whatever happened to the loyal citizens of Greencastle, Ind., who were all worked up over the way you handled their town? . . . the Hoosier ire seems to be burning kind of low . . . or maybe they opened their eyes and took a walk around town . . .

Schaefer wants to know where he should look for the specifications on the new Majestic line . . . the cover story you wrote on the distributors' meeting states that we would print specifications in a forthcoming issue . . . should we write Thompson? . . .

Someone sent us some more dope on Michael Faraday . . . maybe the weekly will come to be used as a piece of biographical reference material . . . not at all improbable, seeing that your Editor on Wheels is already being used as a piece of text material for an English writing course in an Alabama high school . . .

Phone calls have been scarce . . . not even Marge . . . work has been started on the new addition to the offices . . . we miss you at the little sessions right after dinner . . . the *Engineering Section* looks to be great this week, with a full report on the A.S.R.E. convention doings . . . did you get the $50? . . . remember what happened to Schaefer at Buffalo, and don't take up with strangers in hotel lobbies . . . the office is buzzing with the hum of the final work on the DIRECTORY . . . hope you get the New Orleans story, we are getting kind of discouraged with attempts to get it here . . . no need to hurry home, we can pay the rent this month . . . Roy Sharp has a baby daughter . . . Adams smoked your cigar . . . the office girls are betting on whether the Florida sun has tanned you or just added a few more freckles . . . Okay, Miami Beach! . . .

P. B. R.

Gibson Girls—1932

The Collette sisters (Ruth and Mildred), of Earl Carroll Vanities, pose with a 1932 Gibson model.

A DUAL OPPORTUNITY FOR PROFIT IN

Westinghouse

Dual-automatic Refrigeration

1. THE REFRIGERATOR LINE THAT HAS CAPTURED AMERICA

The Westinghouse Dual-automatic Refrigerator has taken the country by storm. Value-seekers are reading about it . . . crowding showrooms to see it . . . and *buying it.* Because it is the one and ONLY refrigerator that is *completely automatic* under *all* conditions . . . the ONLY one that offers *dual value, dual convenience,* and *dual economy* . . . the ONLY one that guarantees *all* the noteworthy features demanded by modern buyers PLUS the *extra value* of *dual-automatic* operation.

This complete line of amazing refrigerators — thirteen handsome models and eight different sizes — offers a size and type for *every* prospect. Its *exclusive* contribution to *carefree* refrigeration has won public preference. It is backed by a concern whose very name is a guarantee to millions. And it is supported by a smashing national advertising campaign in leading publications that carry the unique Dual-automatic story to over 20,000,000 homes every month. It's a line that is easy to sell . . . and one that can make big profits for *you.*

2. THE MOST BEAUTIFUL LINE OF WATER COOLERS IN THE WORLD

Buyers *everywhere* want the new Westinghouse Water Coolers with their striking designs . . . black Micarta cabinets inlaid with aluminum strips . . . and lustrous Chromium trim. *Dual-automatic,* they offer extra economy and *trouble-free* service — for they have the same reliable Built-in Watchman control that is sealed in the heart of every Westinghouse Refrigerator.

The Westinghouse Micarta Water Coolers are available in four models. One is for water supply lines, with bubbler and self-closing faucet. Another is portable for bottle supply. Other types have refrigerated lock-compartments for bottled beverages. There is also an industrial model of attractive design. Every one of these models is in great demand and every one is a profit-maker.

WESTINGHOUSE HELPS YOU SELL . . . GET COMPLETE DETAILS

Other alert dealers are putting a dual-drive into their 1932 sales with these profit-making lines. And so can *you.* Investigate *today* the Westinghouse Dual-automatic story. Let us tell you about the smashing local newspaper campaigns, colorful displays, folders, and other sales-helps that work hand in hand with Westinghouse dealers. Learn, too, about the favorable Westinghouse franchise plan. It will be well worth your while to get full information NOW. Write, wire or telephone.

EVERYTHING YOU NEED TO MAKE MONEY IN REFRIGERATION

If you realize that VOLUME, not discount, determines your profit . . . if you want a COMPLETE LINE — *something to sell to every prospect in your territory* . . . if you want merchandise that combines more *actual selling features* including the *exclusive* Dual-automatic principle, than *any* of your competitors can muster . . . if you want a *full measure* of the kind of advertising and sales promotion assistance that has put the electric refrigerator industry where it is today . . . Westinghouse has a real money-making proposition for you.

It will be well worth your while—regardless of your present connection—to hear the Westinghouse Dual-automatic story and learn how it can put a dual-drive into your 1932 sales. There's no obligation. Write, wire or telephone for full details.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY • REFRIGERATION DEPT. • MANSFIELD, OHIO

Kelvinator Officials Conduct Field Conventions

Boston

BOSTON—More than 400 New England Kelvinator dealers and distributors attended the annual regional convention here, Jan. 30, to hear factory officials describe plans for 1932.

H. Troutwine, Boston branch manager, presided as chairman of the meeting. George E. Mason, president of Kelvinator Corp.; J. S. Sayre, director of sales; G. Strelinger, supervisor of branches, and E. L. Triffitt, of Brooke, Smith & French advertising counsel, attended the meeting.

Headquarters for the meeting were at the Hotel Statler, Boston. The Kelvinator line was introduced, and moving pictures of the Kelvinator factory shown.

Milwaukee

MILWAUKEE—As part of a nation-wide series of distributor-dealer meetings, Kelvinator dealers here met recently at a dinner in the New Pfister hotel to hear advertising and merchandising plans for the year.

A. M. Taylor, advertising manager, described the 1932 campaign, which is the most extensive in Kelvinator history. Other speakers were H. A. Dahl, regional manager; C. E. Willert, chairman of the meeting; E. L. Ferguson of the Milwaukee Association of Commerce, and J. B. Loomis, district manager.

Kelvinator's $150,000 commercial program; a discussion of the Refrigeration Discount Corp., Kelvinator's time payment organization, and the 1932 sales program were some of the features of the meeting.

Cincinnati

CINCINNATI—The annual convention of the Graybar Electric Co., Kelvinator distributor, here, took place in the Netherlands Plaza Hotel, Jan. 29.

William A. McCrellish, manager of the distributing organization, served as chairman of the convention sessions. Vance C. Woodcox, Kelvinator sales promotion manager, and S. D. Camper, regional manager, were among the speakers.

Little Rock

LITTLE ROCK, Ark.—Roy Steuber was in charge of the dealer-distributor convention of 555, Inc., Kelvinator distributor in the Little Rock area, which was held recently at the Albert Pike Hotel.

J. B. Taylor, district manager, Vance C. Woodcox, sales promotion manager, and A. M. Taylor, advertising director, described Kelvinator plans for 1932 and took the audience on a tour through the Kelvinator factory by means of a sound film.

St. Louis

ST. LOUIS—More than 100 dealers and salesmen attended the annual convention of the Kelvinator factory branch of St. Louis at the Statler Hotel, Jan. 22, to discuss Kelvinator sales plans for 1932.

R. C. Houck, manager of the branch, was assisted by Godfrey Strelinger, manager of branches, and sales promotion manager Vance C. Woodcox in the program.

Hagerstown

HAGERSTOWN, Md.—Every phase of the 1932 Kelvinator marketing plan was discussed at a convention of 100 dealers of the Kelvinator-Bohman Co., at the Hotel Dagmar, Jan. 21.

A group of factory executives explained advertising and sales programs, and introduced the 1932 line of refrigerators.

H. W. Burritt, vice president in charge of sales; J. C. Burton, regional manager, and E. L. Triffitt, advertising counsel of Kelvinator Corp., were among the speakers.

Omaha

OMAHA—J. E. Davidson, head of the Nebraska Power Co., and chairman of the executive committee of the Electric Refrigeration Bureau, welcomed dealers and salesmen to the annual convention of the Graybar Electric Co., Kelvinator distributor, at the Hotel Fontenelle, Jan. 30.

The Kelvinator program for 1932 was outlined by a group of speakers from the Detroit factory, including H. W. Burritt, vice president in charge of sales; H. A. Dahl, regional manager; Jay Glaser, district manager, and A. M. Taylor, advertising director.

Following the meeting, new dealer franchises were signed.

Minneapolis

MINNEAPOLIS—About 150 Kelvinator dealers and the commercial organization of the Northern States Power Co. inaugurated their 1932 sales campaign at a convention in the Radisson Hotel, Jan. 28.

Representatives of the Graybar Electric Co., Duluth, the Northwest Public Service Co., and the Puffer-Hubbard Co. were present to hear talks on Kelvinator sales and advertising plans by factory officials.

H. W. Burritt, Kelvinator vice president in charge of sales; H. A. Dahl, regional manager; A. M. Taylor, advertising director, and W. C. Stephenson, district manager, were among the speakers.

Sioux Falls

SIOUX FALLS, S. D.—Even a raging blizzard and 15° below zero weather did not stop the Kelvinator dealer-distributor convention sponsored by the Northwest Public Service Co., Tri-State Power Co., Northern States Power Co., and Union Public Service Co., Jan. 29.

Representing the home office were H. W. Burritt, vice president of Kelvinator Corp.; H. A. Dahl, regional manager; W. C. Stephenson, district manager, and A. M. Taylor, advertising director, who outlined Kelvinator's plans for 1932 in detail.

Knoxville

KNOXVILLE, Tenn.—Dealers and salesmen of the Graybar Electric Co., Kelvinator distributor in this area, heard details of the Kelvinator program for 1932 at a convention Jan. 25 in the Faragut Hotel.

W. H. McCrellish, the company's Cincinnati manager; F. O. Audridge of the Knoxville office; H. M. Daugherty of the Chattanooga office, and Steve Smith of the Johnson City office directed various sessions of the conventions.

The various phases of the year's plans were presented by S. D. Camper, regional manager; Vance Woodcox, sales promotion manager; W. M. DeWitt, district manager, and S. Andrews, representing Brooke, Smith & French, advertising agency.

Nashville

NASHVILLE, Tenn.—One of a series of Kelvinator dealer-distributor conventions was sponsored here recently by the Claude P. Street Piano Co., distributor of Kelvinator refrigerators in this area.

A talking picture showing the Kelvinator factory at Detroit was a feature of the meeting. Vance C. Woodcox, sales promotion manager, and S. Andrews, of Brooke, Smith & French, advertising counsel for Kelvinator, spoke.

Harrisburg

HARRISBURG, Pa.—Kelvinator dealers working under the Kelvinator-Kelly Co., distributor in this area, met at their annual convention late in January at the Crystal Ballroom of the Casino Hotel to hear 1932 plans and to see the new Kelvinator electric refrigerator models.

Central Pennsylvania dealers, and representatives of the Myers Edison Shop, Williamsport, and the Landis Electric Co. were present.

Details of the Kelvinator merchandising program for the year were described by H. W. Burritt, Kelvinator vice president in charge of sales; E. L. Triffitt, advertising counsel, and J. C. Burton, regional manager.

Washington, D. C.

WASHINGTON, D. C.—Barbour & Ross, Kelvinator distributor, sponsored one of a series of localized conventions now being held by Kelvinator organizations in key cities of the country, Jan. 22.

Dealers and salesmen from the territory convened at the Willard Hotel to hear factory executives introduce the 1932 Kelvinator line and outline the year's program.

Among the speakers were H. W. Burritt, vice president of Kelvinator Corp.; J. C. Burton, regional manager, and E. L. Triffitt, advertising counsel.

Scranton

SCRANTON, Pa.—D. T. Lansing, president of the D. T. Lansing Co., Kelvinator distributor in the Scranton territory, directed sessions of a dealer convention at the Hotel Casey recently.

A group of factory executives who were speakers at the convention included: H. W. Burritt, vice president; E. L. Triffitt, of Brooke, Smith & French Co., advertising agency, and C. R. Armstrong, manager of the Refrigeration Discount Corp.

Allentown

ALLENTOWN, Pa.—Werley's, distributor of Kelvinator refrigerators in this territory, held a meeting of all dealers in the American Hotel recently. This is one of a series of similar conventions now being sponsored by Kelvinator Corp. all over the country.

Factory executives outlined merchandising and advertising plans for 1932 and exhibited a talking picture of the Kelvinator factory.

Montgomery

MONTGOMERY, Ala.—The Mathews Refrigerating Co., Kelvinator distributor here, and the Clark & Jones Piano Co., of Birmingham, cooperated at a joint dealer convention at the Whitley Hotel recently, for the purpose of hearing merchandising plans for 1932.

J. S. Sayre, director of sales of Kelvinator Corp., was the principal speaker, outlining the Kelvinator program in both advertising and sales fields.

New Orleans

NEW ORLEANS—J. Parham Werlein and Paul Felder directed sessions of a dealer-distributor convention held by Philip Werlein, Ltd., Kelvinator electric refrigerator dealer, in the Hotel Roosevelt recently.

Plans for the 1932 Kelvinator sales campaign were outlined to the dealers and salesmen who attended the convention by J. S. Sayre, sales manager. A moving picture brought the Kelvinator factory in Detroit within reach of the delegates.

Louisville

LOUISVILLE—Dealers and salesmen working under the Stratton & Terstegge Co., Kelvinator distributor here, attended a convention Jan. 28 at the Brown Hotel to meet factory executives and view the 1932 Kelvinator line.

Sales and advertising plans were discussed, and a sound picture of the Kelvinator factory exhibited by the "flying squadron" from the factory, which included: Vance C. Woodcox, sales promotion manager, and S. Andrews, representing Brooke, Smith & French, advertising agency which handles the Kelvinator account.

Memphis

MEMPHIS—J. E. Dilworth, president of the J. E. Dilworth Co., distributor of Kelvinator electric refrigerators, welcomed dealers and salesmen from this territory at a convention Jan. 27 in the Chisca Hotel.

A group of factory officials headed by Vance C. Woodcox, sales promotion manager of Kelvinator Corp., discussed the 1932 line of refrigerators and sales and advertising plans for the year. A talking picture of the Kelvinator factory was shown to the delegates.

Chicago

CHICAGO—Dealers and salesmen of the L. C. Wiswell Co., 822 S. Michigan Ave., distributor of Kelvinator electric refrigerators, attended a one-day convention Jan. 25 in the Stevens Hotel to hear plans for the year.

Kelvinator's $150,000 commercial program was discussed by H. W. Burritt, vice president of Kelvinator Corp.; advertising plans for the year were explained by A. M. Taylor, advertising manager.

Mr. Burritt also outlined the 1932 sales promotion program. Clarence Tay spoke in the afternoon session on the "Functions of a Distributor," following which the Refrigeration Discount Co., by which Kelvinator allows customers to pay on time, was explained. Thomas H. Maginniss presented the spring program.

Jacksonville

JACKSONVILLE, Fla.—Approximately 50 dealers of Kelvinator-Kimmell, Inc., distributor in this territory of Kelvinator refrigerators, attended the annual dealer convention at the Carling Hotel, Jan. 22.

S. D. Camper, regional manager; J. S. Sayre, general sales manager; Charles Meredith, district manager, and J. M. May, field service representative, representing the Kelvinator factory, outlined the 1932 program to the delegates.

R. E. Kimmell, of the distributing organization, presided at the convention sessions.

FRANK EDWARDS CO. HAS DISPLAY AT LAMB SHOW

SALT LAKE CITY, Utah—The Frank Edwards Co., distributor for General Electric refrigerators here, supplied electric refrigerators for exhibits during National Lamb Week, as well as for the exhibits of the Utah Wool Growers Association, which met at the same time.

Refrigerators were also furnished by the company for exhibits of the Utah Poultry Association and the Utah Farm Bureau, with displays consisting of meats, fowl, and dairy products in all the hotels and Publix Theaters of the city.

FLORIDA HOTEL BUYS FRIGIDAIRE UNITS

ORLANDO, Fla.—Winter visitors returning to the Orlando Court hotel this season found the apartment suites equipped with Frigidaires. Claude H. Wolfe, Frigidaire dealer here, obtained the order and installed the cabinets just as the season opened in the Florida resort.

BUYER'S GUIDE

Manufacturers Specializing in Service to the Refrigeration Industry

SPECIAL ADVERTISING RATE (this column only)—$12.00 per space. Minimum Contract for this column—13 insertions in consecutive issues.

All advertisements set in uniform style of type with standard border. Halftone engravings of 100-line screen, either outline or square finish. No reverse cuts or heavy black effects. No charge for composition.

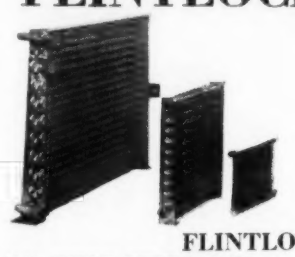
IMITATION FOODS

SELL MORE REFRIGERATORS
BY USING IMITATION FOODS FOR DISPLAY

Send for our special assortment (13 pieces), $10 net, or for our catalogue showing various assortments

Reproductions Company, 210 South St., **Boston, Mass.**

FLINTLOCK CONDENSERS

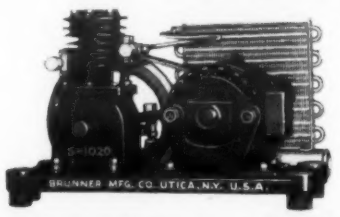


FOR EXTRA CAPACITY
WITH GREATER EFFICIENCY

Used as standard equipment by over 65% of the leading electric refrigerator manufacturers.

FLINTLOCK CORPORATION
4461 WEST JEFFERSON DETROIT, MICHIGAN

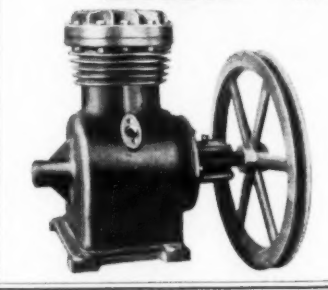
COMPRESSORS



26 years ago BRUNNER commenced the manufacture of compressors. The sum total of over a quarter century of experience stands back of BRUNNER High Sides and Compressors as designed today for the refrigeration industry. Get the complete BRUNNER story at once. BRUNNER Manufacturing Co., Utica, N. Y.

HIGH SIDES and COMPRESSORS by BRUNNER

BARE COMPRESSORS



New 1/6 H. P. Twin 1¼" x 1¼"
For Sulphur Dioxide or Methyl Chloride
Other Sizes 1/6 H. P. to 50 H. P.
"PARKER" Refrigeration Since 1899

H. C. PARKER, LTD.

2600 Santa Fe Ave. (Factory), Los Angeles, California
510 Larkin Street, San Francisco, California
437 Montgomery Street, Jersey City, New Jersey

YOUR ADVERTISEMENT

in this Buyer's Guide Column will be seen by distributors, dealers and refrigerator manufacturers throughout the entire world.

SPECIAL LOW RATES

make it easy to keep industry buyers constantly informed of your products and service.

Electric Refrigeration News
550 Maccabees Bldg. Detroit, Mich.

Fulco Refrigerator COVERS

Insure deliveries without scratched or broken enamel. Write for prices.

Fulton Bag & Cotton Mills

Balsam-Wool Sealed Slabs

NATIONALLY ACCEPTED
Completely satisfactory Refrigerator Insulation

WOOD CONVERSION COMPANY
Industrial Sales Offices:
CHICAGO, 360 N. MICHIGAN AVE.
New York, 3107 Chanin Bldg;
Detroit, 515 Stephenson Bldg;
San Francisco, 149 California St.

BUYER'S GUIDE

Manufacturers Specializing in Service to the Refrigeration Industry

SPECIAL ADVERTISING RATE (this column only)—$12.00 per space. Minimum Contract for this column—13 insertions in consecutive issues.

All advertisements set in uniform style of type with standard border. Halftone engravings of 100-line screen, either outline or square finish. No reverse cuts or heavy black effects. No charge for composition.

HARD and SOFT

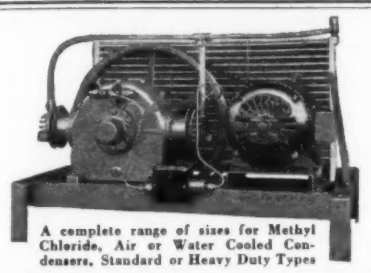
RUBBER PARTS

For Electrical Refrigerating
Ice Cream Cabinet Parts, including

Lid Collars, Sleeves, Brine Hole Stoppers, etc.

Specializing in Rubber Parts manufactured to customer's specification

Dryden Rubber Co., 1014 S. Kildare Ave., **Chicago, Ill.**



A complete range of sizes for Methyl Chloride, Air or Water Cooled Condensers, Standard or Heavy Duty Types

BAKER

Commercial Refrigerating Units

The Profitable Answer to Every Refrigerating Need

Distributor's Inquiries Invited

Baker Ice Machine Co., Inc., 1518 Evans St., Omaha, Nebr.

Manufacturers of Ice and Refrigerating Machinery for more than 25 years

CABINETS

Lacquered Steel and Porcelain Exteriors

Sizes stocked from 3½ to 8 cu. ft. net capacity, also built to specifications for unit installation.
Cabinets for Multiple-jobs

ILLINOIS REFRIGERATOR CO., Morrison, Ill.

SPECIALLY DRIED

SITKA SPRUCE

REFRIGERATOR LUMBER SPECIALISTS

That is—

Dried to less than 9% moisture content
Strong, tough and light weight
Easily milled, nailed and screwed
Odorless and tasteless
Straight and free from warp or twist
Easily sealed, painted or lacquered
Perfect cabinet wood

C. D. JOHNSON LUMBER CO., Portland, Oregon

ALL REFRIGERATORS LOOK ALIKE TO

AMIGO

REFRIGERATOR CLEANER

A million owners waiting for it. Polishes as it cleans—
Lacquer—Porcelain—Hardware—Shelves—Freezing Trays

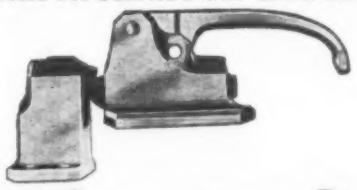
Distributors and Dealers write for sample

Amigo Products Co., 1511 S. Vermont Ave., **Los Angeles, Cal.**

KASON K-40

REFRIGERATOR LATCH

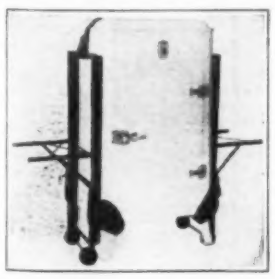
NEW! 1932 Model



Pat. Applied for

Send for Sample on Approval

Kason Hardware Corp., 61-67 Navy St., **Brooklyn, N. Y.**



EASY-WAY

CARRIERS

With an Easy-Way Carrier, any household refrigerator, small or large, can be delivered by two men quicker, better, cheaper than by any other method. Delivery damage to cabinets or to customer's premises practically eliminated. MONEY-BACK GUARANTEE. If you find Easy-Way not as represented, it can be returned C.O.D. within 10 days from invoice date.

Costs only $26.50

R. & R. Appliance Co., Inc. 315 N. Main St., **Findlay, O.**

Frigidaire Names Contest Winners

(Concluded from Page 1, Column 3)

night, Dec. 24. In returning his entry blank each contestant put down the radio station from which he thought he had learned of the contest, and more than 150 stations were mentioned. Listeners of WLW, Cincinnati; WJZ, New York; and KOA, Denver, submitted the most entries.

To enter the contest each person was required to inquire at a Frigidaire store for his entry blank, thus providing a tie-in with the local dealer, and incidentally adding to the Frigidaire prospect list.

The contestant was to make a statement, slogan, or phrase of nine words, the words to begin with the successive letters of the word "Christmas." The statement was to refer to Frigidaire or to its advantages and economies.

Mrs. Johnson's nine-word statement was in the form of a telegram, and said: "Charley: Home. Refrigerator installed. Sent the maid away. Sara."

This was given first prize because of its originality, and because it stimulated the imagination, according to the judges. They believed that it connotes the picture of a happy home, shows pride of ownership in the electric refrigerator, and suggests the economy and usefulness of a Frigidaire since the maid is no longer needed.

Two examples of statements were given in the entry blank: "Close husbands respond if spending their money assures savings," and "Cold control, hydrator render invaluable service through materially added savings." Many of the entries included similar or identical thoughts or words, and were, therefore, discounted by the judges.

Some entries came in elaborate form—as bound leather books, fancy cut outs, or embroidery, but the judges were interested more in the statement itself than in the form in which it was submitted.

Winners of the 10 second prizes, which are 10 W-6 Frigidaires, are as follows: Mrs. Florence B. Mackie, Box 587, Bellflower, Calif.; Mrs. R. M. Hightower, 425 Teller Ave., Grand Junction, Colo.; Frederick Beck, 2152 Kindel Ave., Cincinnati, Ohio; Robert White, 241 W. Main St., Salem, W. Va.; Edgar F. Jones, 1112 W. Magnolia, San Antonio, Tex.; Mrs. Carl Wrede, David City, Nebr.; Barry O'Dell, 471 38th St., Oakland, Calif.; G. W. Dunn, 12507 Dresden Ave., Detroit, Mich.; Louis E. Stueber, 4645 Anderson St., St. Louis, Mo.; Mrs. E. E. Long, 217 Veta Ave., Pueblo, Colo.

Fifty third prizes of $50 each were awarded to these contestants: Mrs. Delbert Snell, 439 Montrose Ave., Kalamazoo, Mich.; Julit Judson, R. R. No. 1, Escondido, Calif.; Mrs. Minnie Johnson, 719 W. Kingshighway, Paragould, Ark.; Nona L. Doherty, P. O. Box 401, Hyattsville, Md.; Herman Schumacher, 1636 Broadway, Indianapolis, Ind.; Russell E. Lieber, 417 Woodrow, New Albany, Ind.

Priscilla L. Martin, 117 W. Pitkin, Pueblo, Colo.; Oscar S. Anderson, 113 E. Cleveland Ave., Newark, Del.; Blanche I. Driver, 492 E. 37th N., Portland, Ore.; Ann Malevinsky, 2201 Commonwealth Ave., Houston, Tex.; Mrs. M. H. Kinney, Brooksville, Ky.; Royden E. Reed, 21 Watson St., Manchester, N. H.

J. P. Sullivan, 1319 W. Minnehaha St., St. Paul, Minn.; Lucy B. Armstrong, 1428 N. Hayworth, Hollywood, Calif.; Robert Bradford, 66 Park St., Orono, Me.; Jean Shiel, 1336 N. 13th St., Philadelphia, Pa.; Charles G. Miller, 526 S. High St., Denver, Colo.; Mrs. A. T. Mitten, Amherst, Mass.

J. H. Kent, 211 Chatillon Rd., Rome, Ga.; Mrs. Vesta E. Burroughs, 708 E. 21st St., Covington, Ky.; John P. Flanagan, 3119 Cliff Ave., Richmond, Va.; Mrs. Daisy K. Graham, 224 S. Allen St., State College, Pa.; Jack Thornton, Odem, Tex.; N. B. Harmon, 1013 E. Eighth, Okmulgee, Okla.

Mrs. J. A. Kemp, 340 Candler St., N. E., Atlanta, Ga.; C. D. Epps, 603½ W. North St., Springfield, Ohio; Edna M. Mohr, 105 S. 13th St., Allentown, Pa.; Mrs. N. O. Swanson, 15 Endicott, Quincy, Mass.; Mrs. Edward W. Abbott, 2 Kensington Rd., Concord, N. H.; Madge Hager, 530 Piedmont Rd., Columbus, Ohio.

James V. Williams, 1056 Cable Ave., Columbus, Ohio; Otto H. Bush, 30 Depot Place, Bernardsville, N. J.; E. W. Huttig, 1439 S. Vine St., Denver, Colo.; Helen Pursell Roads, 304 N. High St., Hillsboro, Ohio; Mrs. George A. Beers, 58 S. Main St., Liberty, N. Y.; Mrs. C. W. Bosworth, Summer Lane, Framingham, Mass.

Harmon Sortore, Metuchen, N. J.; Charles E. Morris, 89 33rd St., Newport News, Va.; Mrs. J. M. Hagen, 2627 Emerson Ave., N., Minneapolis, Minn.; S. S. Stewart, Jr., 1201 Woodlawn Park Dr., Flint, Mich.; John G. Conklin, N. Main St., Essex, Conn.; Harry B. Sennott, Waterloo, Ill.

Iona LaCroix, 204 State St., Meriden, Conn.; Mrs. S. G. Phillips, "Panthers Point Ranch," Muskogee, Okla.; Helen D. Hussey, 660 Ensenada Ave., Berkeley, Calif.; Mrs. Levi A. Dunlap, 200 E. Bosque St., Meridian, Tex.; Creed Cline, Pennsboro, W. Va.; Frances McKee, Box 35, Northport, Ala.; Marion L. Smith, Flossmoor, Ill.; Margaret Theresa Herman, 5680 Broadway, Indianapolis, Ind.

DOMESTIC INDUSTRIES PLANS DEALER DRIVE

(Concluded from Page 1, Column 4)

$99.50, and the larger having a net food storage capacity of 6 cu. ft. and selling for $159.50.

Three distributors have already opened operations, Mr. McClay states. These are the Wholesale Radio Equipment Co. of New York City, the Lyon Co. of Boston, and Kirkpatrick Co. of Los Angeles.

These three firms, with the following list of dealers, have contracted for more than 30,000 refrigerators, according to Mr. McClay. These dealers are as follows:

Hartmann Co., Chicago; Famous & Barns, St. Louis, Mo.; M. O'Neil Co., Akron, Ohio; F. & R. Lazarus Co., Columbus, Ohio; May Co., Cleveland, Ohio; John Shillito, Cincinnati, Ohio; Spear Co., New York and Pittsburgh; Heck Bros., Baltimore, Md.; Heck Co., Washington, D. C.; Lehman, Wolf & Co., Portland, Ore.; Gilcrest Co., Boston.

FRIGIDAIRE INAUGURATES NATION-WIDE BROADCAST

(Concluded from Page 1, Column 3)

and their meanings. A book of his talks, "The Book of Feminine Names," will be given to all those whose names are called during the radio broadcast.

The book lists meanings and derivatives of feminine names, as well as zodiacal signs and the characteristics of each. Birthday gems and flowers symbolizing the months of the year are also listed.

Two networks of NBC stations and nearly 40 stations broadcasting individually will transmit the programs. The NBC Blue Network will be heard Monday and Wednesday nights at 9:30 o'clock, EST, and Sunday nights at 7:15 o'clock. This network includes WJZ, New York; WBAL, Baltimore; KYW, Chicago; WLW, Cincinnati; WGAR, Cleveland; KOIL, Council Bluffs; WJR, Detroit; WREN, Kansas City; WHAM, Rochester, and KWK, St. Louis.

In the Pacific Coast and Rocky Mountain region, it will come through KECA, Los Angeles; KEX, Portland; KPO, San Francisco; KJR, Seattle; KGA, Spokane; KSL, Salt Lake City, and KOA, Denver.

On Tuesday, Wednesday, and Thursday nights, approximately 40 individual stations using electrical transcriptions of the programs, will be on the air. These stations are: WOKO, Albany; WSB, Atlanta; KGHL, Billings, Mont.; WAPI, Birmingham; WBZ, Boston; WKBW, Buffalo; WBT, Charlotte, N. C.; WOC, Davenport, Iowa.

WHO, Des Moines; KTSM, El Paso; WOWO, Ft. Wayne; WBAP, Ft. Worth; WOOD, Grand Rapids; KPRC, Houston; KTHS, Hot Springs; WFMB, Indianapolis; WJAX, Jacksonville, Fla.; WHAS, Louisville; KMBC, Kansas City; WREC, Memphis; WIOD, Miami; WTMJ, Milwaukee; WCCO, Minneapolis; WSBM, New Orleans; WTAR, Norfolk; WKY, Oklahoma City.

WOW, Omaha; WCAU, Philadelphia; KDKA, Pittsburgh; WCSH, Portland, Me.; WRVA, Richmond; WDBJ, Roanoke; WOAI, San Antonio; WTOC, Savannah; KSCJ, Sioux City, Iowa; WBZA, Springfield, Mass.; WFBL, Syracuse; KVOO, Tulsa; WDAE, Tampa; WMAL, Washington, and KFH, Wichita.

THE CONDENSER

ADVERTISING RATE fifty cents per line (this column only).

SPECIAL RATE is paid in advance—Positions Wanted—fifty words or less, one insertion $2.00, additional words four cents each. Three insertions $5.00, additional words ten cents each. All other classifications—fifty words or less, one insertion $3.00, additional words six cents each. Three insertions $8.00, additional words sixteen cents each.

REPLIES to advertisements with box numbers should be addressed to the box number in care of Electric Refrigeration News, 550 Maccabees Building, Detroit, Mich.

POSITIONS WANTED

FACTORY REPRESENTATIVE for EUROPE. REFRIGERATION and RADIO EXPERT. Eight years of executive experience in appointing, organizing, supervising Distributors and Dealers throughout Europe, Balkans, North Africa. Particularly fit for adapting specialty selling and American modern merchandising methods to European conditions. Has strong personality, diplomacy, tact and initiative. High education, speaks several languages, well introduced in European business and banking circles. Best references available. Salary not main object. Connection with reputable, strong concern, prime importance. Box 416.

SERVICE MANAGER desires connection with active distributor of domestic and commercial electric refrigerator. Capable of reorganizing metropolitan installation, service and shop departments, including the supervision of service activities of provincial dealer organization. A six-year active position with a prominent distributor of a nationally known electric refrigerator, coupled with first class references, are main qualifications. Box 417.

EQUIPMENT WANTED

WANTED—Commercial equipment. Frigidaires, Kelvinators in any condition. Any kind of expansion coils wanted. Have for sale Servels, Iroquois and Copelands, compressor and cooling coil; $25.00 without motor. B. L. Williams, 1004 Pa. Ave., N. E., Washington, D. C.

INCREASE *Your* INCOME AT HOME... In Spare Time!

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This Valuable **FREE BOOK** *Tells How!*

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404 No. Wells St., Dept. 422, Chicago, Ill.

GIBSON DEALER EXHIBITS AT KANSAS CITY SHOW

KANSAS CITY—The Townley Metal & Hardware Co., recently appointed distributor for Gibson electric refrigerators in this territory, had a display booth at the Better Home and Building Exposition which closed recently. The booth was handled by the Grahm-Evarts Co., local dealer.

Another Gibson exhibit is being prepared by the distributor for the Radio and Electric Refrigerator Show to be held at the Power & Light Building, here, the third week in March.

SUBSCRIPTION ORDER

Business News Publishing Co.,
550 Maccabees Bldg.,
Detroit, Mich. 1932

Sirs:

Please enter order for subscriptions as follows:

☐ Electric Refrigeration News only ☐ 1 year ☐ 2 years.

☐ Refrigerated Food News only ☐ 1 year ☐ 2 years.

☐ 1932 Refrigeration Directory (To be issued March 1, $2.00 per copy).

☐ Electric Refrigeration News and Refrigerated Food News. Combination rate for both papers ☐ 1 year ☐ 2 years.

SUBSCRIPTION RATES (Effective Jan. 1, 1932)	Electric Refrigeration News		Refrigerated Food News		BOTH PAPERS	
In United States and Possessions and all countries in Pan-American Postal Union	1 Yr. $3.00	2 Yrs. $5.00	1 Yr. $1.00	2 Yrs. $1.50	1 Yr. $3.50	2 Yrs. $6.00
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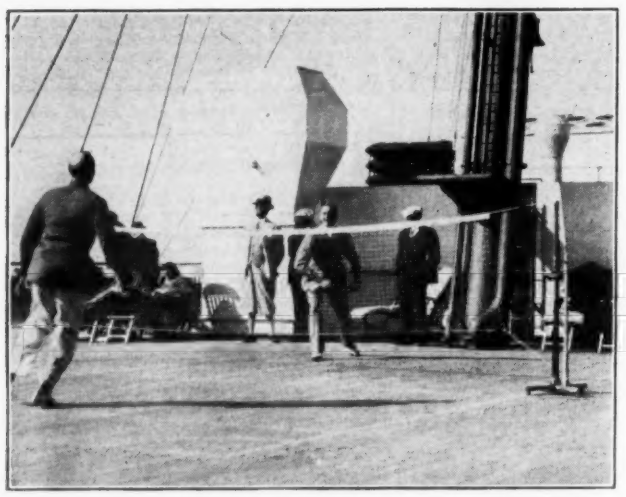
2-10-32

Rex Cole's Boys Frolic on Shipboard and in Bermuda

A Game of Deck Tennis



P. B. Zimmerman and C. F. Judson, Jr., in a stirring game of deck tennis.

Two of the "big guns" talk it over. Rex Cole and P. B. Zimmerman in a pleasant chat.

And Some Shuffleboard

Toppers bask in the south Atlantic sunshine while watching the activities of the shuffleboard players.

Left to right we have Paul H. Hichborn, retail sales manager; John H. Hewelett, director press relations division; and C. W. Kedall, Bay Ridge Retail Division, all of Rex Cole, Inc.

George Witherspoon, Henry Raphiel, Frank Tantphoens, and H. G. Bancroft (reading from left to right) of Rex Cole's organization, take their exercise at shuffleboard.

Harold C. Caspers, assistant manager, apartment house department, and I. S. Sherman of the apartment house department of Rex Cole, Inc., take a ride.

Wives of the distributors take advantage of tea time in Miami to compare notes.

"Just pals" are Henry Raphiel and George J. Stifter, both of the Bronx apartment house division, pictured in front of new Windsor hotel, Hamilton, Bermuda.

William Aronstein and J. Frank Vernon, both of Rex Cole, Inc., do a little sailoring.

William J. Clark, sales director, Queen's Village retail division, takes the "rest" cure.

Adrian D. Black, director showroom division, is showing Arne Larsson, wholesale commercial specialist, something behind the camera.

William A. Fisher, manager of Rex Cole's production department, has a big smile for the camera.

A sophisticated sales promotion manager is "Ham" Campbell of the Rex Cole group.

WRITTEN TO BE READ ON ARRIVAL

Engineering Section

IN TWO PARTS PART TWO

ELECTRIC REFRIGERATION NEWS

Registered U. S. Patent Office

The business newspaper of the refrigeration industry

ISSUED EVERY WEEK
VOL. 6, NO. 23, SERIAL NO. 151

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DETROIT, MICHIGAN, FEBRUARY 10, 1932

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THREE DOLLARS PER YEAR

NORGE IMPROVES PRODUCTION LINE IN ALASKA PLANT

New Equipment Placed In Muskegon Factory

DETROIT—Since the Alaska Refrigeration Corp., of Muskegon Heights, Mich., was acquired last spring by Norge Corp., division of Borg-Warner, extensive alterations and improvements have been made in the Alaska plant, including the installation of much new equipment, according to Howard E. Blood, Norge president.

"With our new equipment installed, and numerous other improvements instituted affecting various methods and processes, we are adequately equipped to serve our distributors and dealers efficiently and promptly. With the exception of the Rollator compressor, which is still built in Detroit, all Norge manufacturing is now centered in Muskegon, and the complete refrigeration units assembled there," Mr. Blood stated.

Prominent among the new equipment installed, according to Mr. Blood, are modern, automatically-controlled, continuous electric porcelain furnaces. Specially constructed conveyors for carrying the work through the furnaces, and special arrangements in the furnaces for dust seal around the conveyor have been provided in order to prevent particles of dirt from being deposited on the ware.

In addition, an extensive flood lighting system has been installed, under which all ware must pass and be inspected. This system eliminates all shadows and assures a uniform condition under which the porcelain is inspected. It also prevents any changes in weather conditions and different natural light from affecting the high standard of the work. The smallest defect may be observed instantly by this method of lighting, Mr. Blood claims.

Improved facilities have been provided for handling the raw and finished materials. Carloads of rough lumber are transferred by conveyor system, and carefully graded before going through dry kilns to be thoroughly cured and dried, a process which requires from one to two and one-half weeks.

After leaving the dry kilns, it is processed through the wood-working department, the work being done by semi-automatic modern wood-working machinery. The operations flow continuously so that the kiln dried lumber leaves the opposite end of this depart-

(Concluded on Page 2, Column 1)

DOMESTIC INDUSTRIES MARKETS 2 NEW UNITS

MANSFIELD, Ohio—Two electric refrigerators, rate at 4.7- and 6-cu. ft. net food storage capacity, are now being produced and distributed by Domestic Industries, Inc.

The new refrigerators, which have been given the trade name, "Buckeye," are equipped with compressors made by the Dayton Pump Co., the compressors being of the vertical reciprocating type. Sulphur dioxide is the refrigerant used.

A 1/6-hp. induction-repulsion Leland motor powers the compressor. The unit is of the package type, with dry expansion coils and an American Radiator expansion valve. A Ranco thermostat is used which gives eight points of cold control, and operates with an automatic cut-out.

A modified "floating power" principle is used to reduce vibration caused by the motor and unit, which are located in the top of the box. The top of the cabinet supports four corner posts with bent arms. These arms are drilled for holes from which springs are slung diagonally to hold the section on which the motor and compressor are bolted.

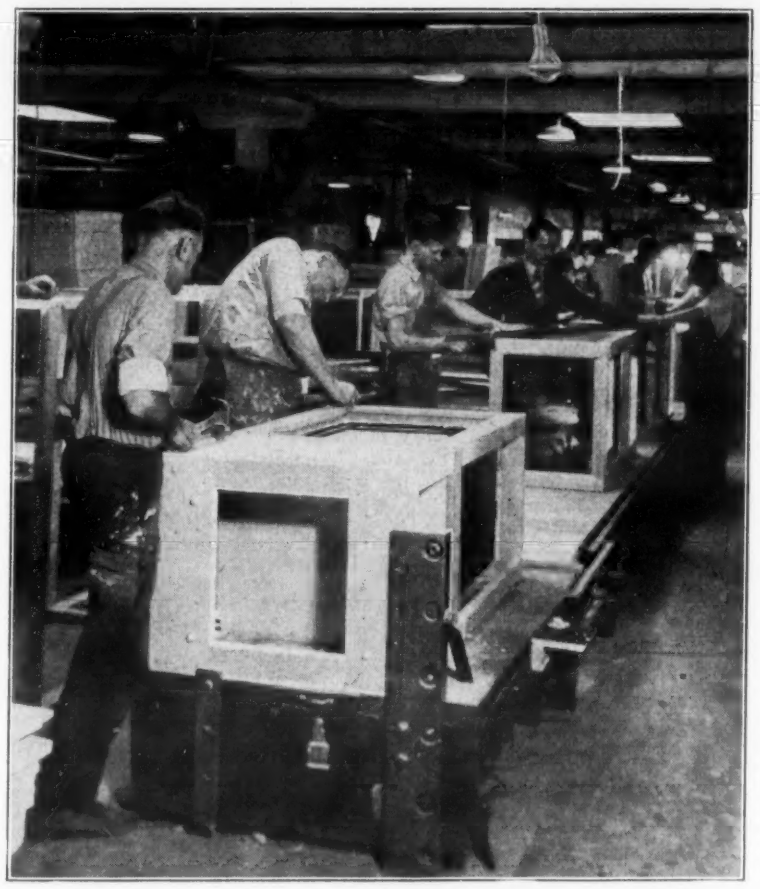
The cabinet is of steel with a finish

(Concluded on Page 2, Column 4)

YORK RECEIVES ORDERS TOTALING $400,000

YORK, Pa.—Orders totaling $400,000 recently received by the York Ice Machinery Corp. for refrigerating machines have necessitated increased production schedules, it is announced.

Norge Cabinet Line in Action



View of the cabinet assembly line of Norge's cabinet plant in Muskegon, Mich., where a modernization program has just been completed.

KELVINATOR REVEALS 4-CYLINDER MODELS

DETROIT—Formal announcement of a new pair of condensing units has been made by the Kelvinator Corp. following the completion of a series of field tests started in October.

The new units, designated as WRD 130 and WRD 150 are four-cylinder vertical reciprocating models using 2-hp. and 3-hp. motors, respectively. Anhydrous sulphur dioxide is the refrigerant used.

The WRD 130 model has an ice melting effect of 70 lbs. per hour, and the WRD 150 has an ice melting effect of 100 lbs. per hour, A.S.R.E. ratings.

Two piston rings are used in each cylinder. Piston pins are of chrome nickel steel, hardened and ground. Bore and stroke is 2¼x3½ in. The cylinder head is water cooled.

Poppet type suction valves are used. Discharge valves are of the reed type, retained by two screws and springs. Service valves are drop-forged brass, 2-way type, provided with connections for service gauges.

The new units are equipped with ⅝-in. suction and ¼-in. liquid tubing with S.A.E. flared tube connections.

Patented bellows, with one end of non-

(Concluded on Page 12, Column 4)

COPELAND APPOINTS NEW REGIONAL SERVICE HEADS

MT. CLEMENS, Mich.—The appointment of W. R. MacFadden and John H. Stubbs as regional service managers was announced last week by Harry Newcomb, general service manager, Copeland Products, Inc.

Mr. MacFadden, who becomes regional service manager for the midwest territory, has been in the service department of Copeland for three years. His work has been with dealers, helping them organize and conduct their service departments.

Although a new man in the Copeland factory organization, Mr. Stubbs, who becomes eastern regional service manager, has for a number of years been in charge of service departments of various Copeland distributors.

PACIFIC REFRIGERATION CORP. ORGANIZED IN SEATTLE

SEATTLE—The Pacific Refrigeration Sales Corp. was recently formed and duly incorporated in Seattle to sell and install refrigeration machinery and equipment. Incorporators are P. Wightman and Gordon W. Howell.

Apex Co. Presents 1932 Line of 5 Models

CLEVELAND—Five models, three with lacquer exterior finishes and two with porcelain exteriors, comprise the line of electric refrigerators which the Apex Rotarex Corp. has just announced.

The Apex cabinets have been redesigned to carry out the "pendant" idea which characterizes the Apex nameplate now being placed on the front of each cabinet door, Tom J. Smith, general manager, points out. Improvements have also been made in the design of the condensing unit so that it will have less vibration, he announced.

Model L-500 is offered with a lacquer exterior, and provides 4.4 cu. ft. of gross capacity, or 4.1 cu. ft. net capacity according to N.E.M.A. ratings. It has 7.6 sq. ft. of shelf area. Dimensions are: 49½ in. high, 24¾ in deep, and 26 in. wide. It makes 56 ice cubes.

Models L-600 and P-600 are finished in lacquer and porcelain respectively, and have 5.5 cu ft. of gross capacity, or 5.1 cu. ft. of food storage capacity, N.E.M.A. ratings. Shelf area of these models is 9.2 sq. ft., while each produces 84 ice cubes. Dimensions are: 51½ in. high, 26½ in. deep, and 28⅜ in. wide.

Models L-800 and P-800 are the lacquer and porcelain types in the largest size. They have 7.8 cu. ft. of gross capacity, 7.3 cu. ft. by the net N.E.M.A. rating method. Shelf area is 12.1 sq. ft., while ice cube capacity is 112. Dimensions are: 57 in. high, 26½ in. deep, and 31⅝ in. wide.

Penn temperature controls have been adopted; 2½ in. of Celotex insulates the cabinets; Mullins porcelain-on-steel evaporators are standard; and cabinet liners of all models are of white porcelain.

CHICAGO FIRM ANNOUNCES NEW COIN METER DEVICE

CHICAGO—The "Lektrometer" coin meter device for electric refrigerators, just announced, has a New Haven Westinghouse self-starting clock which operates in connection with mercury switches.

The coin meter device is sold by Shay-West Co. of Chicago, distributor for the United States and Canada. It is manufactured by the Chicago Electric Mfg. Co.

The meter takes a deposit of 25 cents a day, or $2.50 in quarters at one time.

A feature of the Lektrometer is the jewel "tell-tale" signal over the clock

(Concluded on Page 9, Column 4)

Refrigerated Trucks To Be Discussed, Detroit, Feb. 15

Insulation, Body Design, Power Devices On Program

DETROIT—Engineers conversant with the latest technical developments contributing to successful design and operation of refrigerated trucks will gather here on Monday, Feb. 15, for an afternoon and an evening session of the Detroit section of the American Society of Refrigerating Engineers to exchange ideas on truck refrigeration.

An afternoon meeting will start at 2 o'clock with an open discussion, while the evening meeting will consist of a 6 o'clock dinner and a group of talks beginning at 8 o'clock. Both meetings, including the dinner, will be held in Webster Hall, Cass and Putnam Aves.

Although the complete program has not been fully worked out, the topics to be discussed include the use of aluminum insulation for truck bodies, the construction and body design of insulated trucks, the use of the frozen brine system of truck refrigeration, solid carbon dioxide in truck refrigeration, and gas engines for refrigerated trucks.

Speakers now definitely scheduled to address the meeting include J. R. Willard of the Aluminum Company of America, Pittsburgh; Joseph T. Downey, vice president of the Balsa Wood Co., Brooklyn; G. A. Elliott of the Consolidated Equipment Corp., Greenville, Mich.; A. H. Quade, Briggs & Stratton representative in Detroit; Gale T. Pearce, engineer with the Dry-Zero Corp., Chicago; John Wyllie, Kelvinator engineer, Detroit; E. C. Wood, assistant to the vice president of the North American Car Corp., Chicago; and R. B. Harvey of the Novo Engine Co., Lansing, Mich.

Everyone interested in the operation or design of refrigerated trucks, and parts to be used in their manufacture, are invited to attend, according to F. M. Cockrell, publisher of ELECTRIC REFRIGERATION NEWS and chairman of the meeting.

Convention Reports In this Issue

Throughout this issue are published reports of each technical session of the 17th annual meeting of the American Society of Refrigerating Engineers, held Jan. 25 to 29 in Cleveland. Of special interest at this time are the joint sessions of the A.S.R.E. and A.S.H.V.E. on air conditioning—all reported in detail.

FRIGIDAIRE EXHIBITS ITS AIR CONDITIONERS

CLEVELAND—Frigidaire's complete line of new air conditioning equipment was on display at the second International Heating and Ventilating Exposition here. Included in the display were the new air conditioners, the dehumidifier, the 3-ton F-12 compressor designed especially for air conditioning loads, the cooling coil for furnace installation, and the new T-500 water cooling tank.

Displayed publicly for the first time, the air conditioners include the following models:

Models H-3 and H-4, horizontal floor type, available in burled walnut lacquer on steel, with overall dimensions of 14 in. in width, 39¼ in. in length and 31¾ in. in height, and floor area of 5½ sq. ft. Oak or mahogany lacquer on steel may be had on special order when desired.

Models V-3 and V-4, vertical wall type, with overall dimensions of 14 in. in width, 28¾ in. in length and 42⅝ in. in height, with floor area of 4 sq. ft.

Model S-3 suspended type, equipped with four eyebolts for hanging, in ungrained mahogany lacquer on steel, with overall dimensions of 24 in. in width, 18¾ in. in depth and 22 in. in height. This model covers 4 sq. ft. of wall space.

All models have spiral finned copper cooling coils, and the V-4 and H-4 models have spiral finned copper tubing heating coils with about 118 sq. ft. of surface.

The H and V models are equipped with Sirocco centrifugal fans powered by 1-20 hp. motors. The air movement in the V models is at the rate of 450 cu. ft. per minute, in the H models at 550 cu. ft. per minute, and in the S model, which has a bladed fan instead of a centrifugal fan, is at the rate of 585 cu. ft. of air per minute.

A fan switch and compressor switch, mounted in the end of the cabinet, control the V and H models. The S model is governed by two similar switches mounted separately. Thermostats are optional.

The sound-proof housing for installations where the compressor is placed in the same room with the conditioner is available in burled walnut wood. Oak or mahogany wood is available on special order. Its overall dimensions are 46 in. in width, 30 in. in depth, and 30 in. in height. This housing may be

(Concluded on Page 12, Column 2)

BRUNSWICK - KROESCHELL SELLING WORTHINGTON LINE

NEWARK—Effective Feb. 1, a sales agreement has been consummated between the Worthington Pump and Machinery Corp. of Harrison, N. J., and the Brunswick-Kroeschell Co., here, a division of Carrier Corp., by which the Brunswick-Kroeschell group will handle exclusively all Worthington feather-valve compressors of the large industrial type.

The new arrangement extends the Brunswick-Kroeschell line to the industrial refrigeration sizes, and in no way affects the sale of the standard Brunswick-Kroeschell commercial machines, officials announce.

GENERAL ELECTRIC PLANS SPRINGFIELD ADDITION

SCHENECTADY, N. Y.—Plans for a two-story factory branch, distributing and service building, to be located in Springfield, Mass., are being made by General Electric Co. here.

13 DOMESTIC MODELS IN '32 COPELAND LINE

MT. CLEMENS, Mich.—Thirteen domestic models are included in the Copeland 1932 household line, while to the commercial line has been added a one-ton compressor and a Larkin-Copeland cube ice maker.

The household models range in size from a box of 4.4-cu. ft. net food storage capacity, to a box of 15.5-cu. ft. net food storage capacity, N.E.M.A. ratings.

The line is divided into three groups, each in a different price range. The lower priced group consists of two models, the A-442 and A-562, built for small homes and apartments.

In the intermediate line there are six models, in three sizes. The sizes are duplicated in models which vary only as the exteriors, three being of porcelain and three in lacquer.

A new paper insulation, "Corrigant," is used in the 1932 line. It comes in pads, each wrapped in a moisture-proofing material, and fitted tightly into place.

All models are equipped with a new sliding web basket, and with a lower telescopic shelf, which slides into half its size to allow bottle space in the bottom of the refrigerator.

The new one-ton condensing unit is of the three-cylinder vertical type with a rated capacity of 2,375 lbs. of refrigeration, according to the A.S.R.E. method.

The model is equipped with a 2-hp. motor with specially built-in spiral gear reduction device delivering a speed of

(Concluded on Page 2, Column 5)

WESTINGHOUSE PROMOTES H. C. THOMAS

EAST PITTSBURGH—H. C. Thomas, who has been director of manufacturing stocks for Westinghouse Elec. & Mfg. Co. here, has been appointed assistant to the general works manager of the company.

He is a graduate of Purdue University, and was first employed by Westinghouse in the repair department.

NORGE INSTALLS NEW CABINET MACHINERY

(*Concluded from Page 1, Column 1*)

ment a completely finished cabinet frame. The frames continue on the power assembly conveyor where the insulation is applied.

Then the exterior steel is applied to the cabinet, each sheet of steel undergoing individual inspection to make sure it is free from any defects. Samples of all steel are tested for hardness, grain structure, and analyzed by the metallurgical department.

Next, large modern presses and shears fabricate the sheets into the various parts required. All parts are individually inspected by metal finishers.

The parts then pass on to the bonderizing department where all Norge exterior steel is chemically treated for rust-proofing. Steel parts pass through chemical tanks of rust-proofing material on a continuous conveyor, then through rinse tanks where they are thoroughly cleaned.

Continuing on the conveyor, they are glazed, and still further cleaned by means of a naphtha wash to make certain that not even moisture left by the touch of the human hand remains before finishing materials are applied.

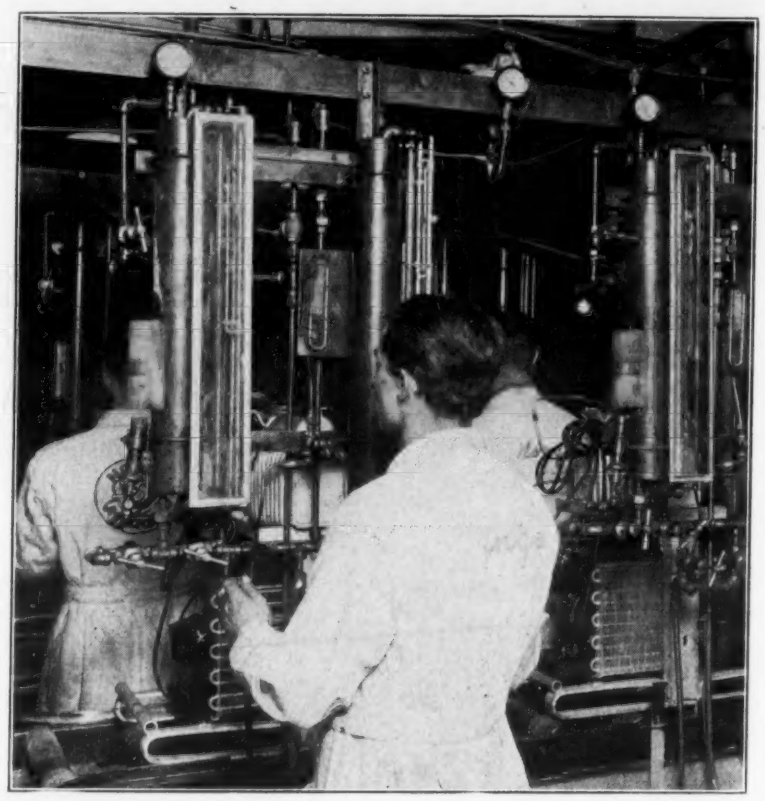
For the lacquer cabinets, the steel exterior panels are assembled to the cabinet frame, and the cabinet passed through the hands of enamel finishers until a clean surface is obtained for the application of the first coat of enamel.

The enamel is then baked at accurately controlled temperatures. For this purpose ovens have been installed that are automatically controlled and through which air is automatically circulated at pre-determined temperatures.

After emerging from the ovens it is necessary to cool and dry the cabinet, for which purpose large continuous cooling tunnels have been installed. Approximately 30,000 cu. ft. of air per minute is forced through the cooling tunnels to complete the process—then the lacquer is again sanded to a smooth surface, and the next coat applied.

Each cabinet is then inspected, followed by the trimming operation which consists of the assembly of the doors, hardware, name plates, etc., all on continuous assembly lines by cabinet workers. Again the cabinets are inspected.

Rollators on Charge



Battery of charging boards in the modernized Norge-Alaska plant.

Bulkeley Sub-zero Chart Exhibited To Engineers

CLEVELAND—A new Bulkeley psychrometric chart, treating temperatures down to minus 40° F. such as have never before been detailed in such a diagram, was presented to the air conditioning session of the A.S.R.E. and A.S.H.V.E. here by Claude A. Bulkeley, chief engineer of the Niagara Blower Co. and author of the well-known Bulkeley charts dealing with normal temperatures.

The new chart is expected to be useful in air conditioning studies, and for cold storage work.

From it one can immediately determine such quantities as wet bulb temperature, dew-point of the air, relative humidity, grains of moisture per cu. ft. or per lb. of air, the weight of the air per cu. ft., and the total heat per lb. of air at saturation wet or dry bulb temperatures, Mr. Bulkeley explained.

Vapor pressures at different temperatures are plotted on the vertical ordinate in millimeters of mercury to a logarithmic scale. The saturation line is an upper diagonal straight line running between the lower left and the upper right-hand corners of the chart, he pointed out.

"Relative humidity lines run parallel to and below the saturation line. Vertical lines are dry-bulb temperatures. All horizontal lines to the right of the saturation line are dew-point temperatures. The wet-bulb lines are those curving downward to the right of the saturation line," he stated.

Up to the present time, temperature has been considered of prime importance in cold storage work, and engineers have been inclined to overlook the control of humidity.

"It is however, a great advantage and improves the qualities of food products, if as much as possible of the original moisture is retained," he declared. "When these food products are sold by weight, any shrinkage due to loss of moisture results in a proportional loss in amount sold.

"The way to prevent objectionable shrinkage in cold storage is to maintain automatically a high relative humidity. The higher the relative humidity, the less moisture will be absorbed by the air surrounding the stock," Mr. Bulkeley stated.

The practical way to carry the desired relative humidity, and keep it under control, is to pass the circulated air through a spray chamber in which the air leaves the eliminators approximately at saturation, he believes.

As in air conditioning at normal temperatures, this can be accomplished by either of two methods, he claims:

1. By a central plant which removes the moisture from the air, and distributes the air throughout the cold storage plant, refrigerated coils in the spray chamber providing proper temperatures of the spray water.

2. By unit brine spray air conditioners, combining all the features of the central plant—spray chamber, spray nozzles, spray pump and motor, cooling coil, eliminators, and a motor driven fan.

KNUDSEN GIVES WAYS OF PREVENTING NOISE

CLEVELAND—To control the noise of air conditioning equipment operating in theatres and auditoriums where it is objectionable, Dr. V. O. Knudsen, associate professor of physics of the University of California, West Los Angeles, made several suggestions in the joint A.S.R.E.-A.S.H.V.E. meeting, Jan. 27, in the Little Theatre of the Cleveland Auditorium.

"Surround the equipment room with proper insulating materials, control the sound carried by ducts to the auditorium with correct duct design and noise filters, and mount the air conditioning machinery so that its vibration will not be transmitted in the form of noise," he advised the convention delegates.

Taking a theatre installation to illustrate his views, Dr. Knudsen pointed out that the equipment room should, if possible, be located at a considerable distance from the auditorium, but that it is not necessary if proper steps are taken to insulate the noise which may be transmitted through the walls of the equipment room and through the ducts.

"All rotating or vibrating equipment should be mounted on flexible supports which are so resilient that the natural frequency of the mass of the equipment on the flexible support will be low in comparison with the frequencies of the vibrations generated by the equipment," he declared.

"If the fundamental frequency of vibration produced by the machine be 100 cycles per second, the natural frequency of the mass of the machine on its flexible support should not exceed about 20 cycles per second," he stated.

With properly designed walls and ceiling, the equipment room can be located as near the auditorium as desired—provided that sufficient insulation is used in the air ducts, he claimed.

In general, the reduction of noise transmitted through ducts is proportional to the length of the duct, inversely proportional to duct's average cross-sectional area, and proportional to the coefficient of sound-absorption of the interior surfaces of the duct, he pointed out.

"Long, narrow ducts, lined with highly absorptive material, provide effective 'attenuators' or sound filters," he said. "A small duct, having a cross-section of 4x6 in., lined with absorptive felt or fibre board, will help materially in reducing the noise transmission."

He concluded his talk by urging the air conditioning engineers to give increased attention to the reduction of noise produced by their equipment.

DOMESTIC INDUSTRIES OFFERS TWO NEW MODELS

(*Concluded from Page 1, Column 1*)

of three coats of White Duco. Insulation is 3-in Kapok, wrapped in slabs, and hydrolene sealed. The interior is of 1-in. vitreous porcelain. Hardware is heavy forged brass, chromium plated, the latch being of the roller pin type.

Specifications on the Model M-53 are as follows: net food storage capacity, 4.7 cu. ft.; shelf area, 8.5 sq. ft.; height, 57½ in.; width, 25½ in.; depth, 21½ in.

Three trays are used to make 63 cubes at one freezing. Ice melting capacity is 4.08 lbs. per hour.

Model M-71 has a net food storage capacity of 6 cu. ft.; a shelf area of 11 sq. ft.; height, 59½ in.; width, 34½ in.; depth, 22½ in. It will freeze 105 cubes at one freezing, and its ice melting effect is 4.99 lbs. per hour.

COPELAND DOMESTIC LINE INCLUDES 13 MODELS

(*Concluded from Page 1, Column 5*)

365 revolutions per minute to the compressor.

A magnetic relay switch is bracketed to the motor as standard equipment and wired to the control and motor, eliminating this wiring at the time of installation.

The unit is entirely enclosed with the exception of a short drive shaft connected to the compressor by a new design of flexible coupling. A large water jacket, connected to the water outlet of the condenser, surrounds the cylinder head and part of the cylinder walls to keep the head cooled.

The Copeland-Larkin cube ice maker has a capacity of 60 lbs. at one freezing, or 240 lbs. per 24 hours in continuous operation removal of alternate trays when used with Copeland Model R ½-hp. air cooled compressor.

It has an added ice storage capacity of 30 lbs. of ice cubes. A total of 432 cubes may be frozen at one freezing in the 18 trays, it is claimed.

Trays are of aluminum and the interior of Armco iron. Front panel and tray forms are chrome plated. Insulation is 3 in. of sheet cork throughout. The exterior is of white porcelain, trimmed in gray.

* * *

Copeland Commercial Specifications

Model No.	Cylinders	Motor Hp.	Condensing Medium	Capacity Lbs. I.M.E.*	Installation
IC-1	1	1/6	Air	99	I.C. Cabinet
IC-2	1	1/4	Air	212	I.C. Cabinet
IC-3	2	1/3	Air	488	I.C. Cabinet
IC-4	2	1/3	Water	488	I.C. Cabinet
AM-200	1	1/4	Air	212	Commercial
Q-252-C	1	1/3	Air	246	Commercial
R-516-C	2	1/2	Air	488	Commercial
RW-516-C	2	1/2	Water	488	Commercial
W-825-B	2	3/4	Water	776	Commercial
WA-825-B	2	1	Air	776	Commercial
X-1200-B	2	1	Water	1073	Commercial
XA-1200-B	2	1 1/2	Air	1073	Commercial
T	3	2	Water	2375	Commercial

*From test based on A.S.M.E. and A.S.R.E. standard ton (5° F. low side—86° F. high side)

Copeland Domestic Unit Specifications

Model No.	Food Storage Capacity Cu. Ft.	Shelf Area Sq. Ft.	Ice Cubes	Motor Hp.	Height Inches	Width Inches	Depth Inches
A-442	4.40	9.08	63	1/6	52¼	24⅜	22⅞
A-562	5.60	9.08	63	1/6	58¼	24⅜	22⅞
A-522	5.20	11.10	81	1/6	52½	26⅜	24¾
A-612	6.10	12.70	108	1/6	56⅛	30	25
A-772	7.60	15.60	162	1/6	62⅛	30	25
P-522	5.20	11.10	81	1/6	52½	26⅜	24¾
P-612	6.10	12.70	108	1/6	56⅛	30	25
P-772	7.60	15.60	162	1/6	62⅛	30	25
D-682	6.80	12.70	108	1/6	59¼	34⅛	25¼
D-932	9.30	15.60	162	1/6	66½	34⅛	25¼
E-682	6.80	12.70	108	1/6	59¼	34⅛	25¼
E-932	9.30	15.60	162	1/6	66½	34⅛	25¼
E-1552	15.50	25.90	162	1/4	66½	52	25¼

BUNDY TUBING

COPPER HYDROGEN ELECTRIC WELDING

Copper Hydrogen Electric Welding is a process in which separate steel parts are welded by pure copper at all points of contact. In a hydrogen charged electric furnace copper alloys with steel—steel alloys with copper. There is a penetration of the copper along the grain boundaries of the steel and finally the grains of the steel itself grow across the joint, producing a uniform continuous weld. In reality an iron-copper alloy is produced rich in iron, possessing the strength of steel.

In scores of instances where steel parts must be assembled into an integral uniform unit Copper Hydrogen Electric welding will effect long life, gas tightness, strength at the joints and a clean surface.

The Bundy Tubing Company is the only source in the world at which this type of general commercial welding can be obtained. We will be glad to discuss your problems and undertake experimental work which we believe will open your eyes to new economies and a superior product.

BUNDY TUBING CO.

Detroit, Mich., U. S. A.

ALSO MANUFACTURERS OF BUNDYWELD STEEL TUBE

Conductivity Chart

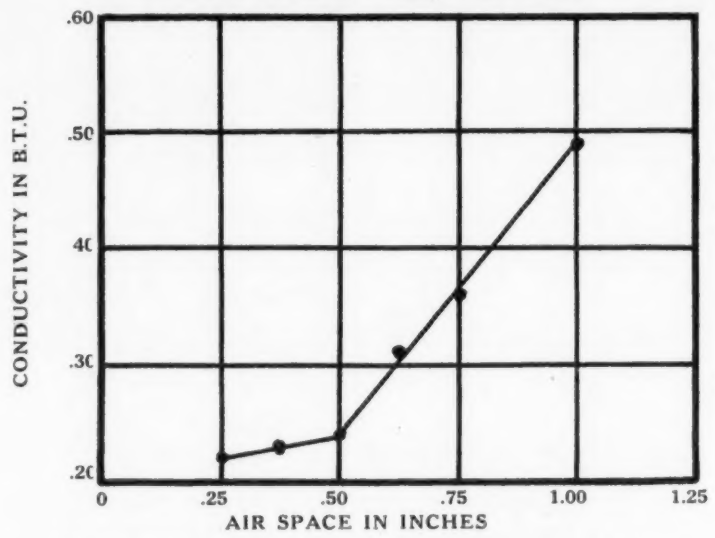


Chart showing how the conductivity of aluminum foil insulation varies with spacing of the sheets.

* * *

Gregg Discusses Battelle Research on Metal Foil Insulation

CLEVELAND—Research in the properties of metal foil as an insulating material, sponsored by the Reynolds Metal Co. and conducted at the Battelle Memorial Institute, Columbus, was described to A.S.R.E. members here, Tuesday, Jan. 26, in a paper by J. L. Gregg of the institute.

That radiant heat "bounds off" a shiny metal surface and is not readily absorbed by it, is one of the fundamentals of physics, Mr. Gregg pointed out, and that air is a superior heat insulator is another basic maxim.

"The proper combination of metal surfaces with air can reduce heat transfer by radiation and convection, so that in spite of the fact that metals are good conductors of heat, good heat insulators can be made of metal when assembled so as to utilize these principles," he declared.

Thin Metals Best

Since it is the surface characteristic of the metal that produces its insulating value, he continued, one soon comes to employ very thin metals such as foils. Aluminum is the metal which best combines the needed reflectivity with the lowest thermal capacity, and the ability to be rolled into foil with the greatest surface stability.

"Experimental data recently published prove that low conductivity insulating units can be made of bright metal arranged to form air spaces one-half inch or less in thickness," he said, referring to articles by King, Breitung, Schad, and Cammerer.

Two general methods have been suggested and are being used. Either smooth sheets of foil are held apart by suitable spacers, or metal foil sheets are slightly crumpled and stacked one over another so as to form irregular air layers.

Air Is Good Insulator

"The thermal conductivity of air is appreciably smaller than the conductivity of most commercial insulating materials," Mr. Gregg declared, "and if it were not for the transfer of heat by convection and radiation, air layers in all cases would be excellent insulators.

"If an air layer several inches thick is partitioned into layers one-half inch or less in thickness with thin sheets such as paper, the heat transferred by convection becomes negligible, but an appreciable amount of heat is transferred by radiation. If the paper is replaced by thin bright metal, however, the heat moving by radiation becomes small, and the apparent conductivity of the unit approaches the true conductivity or air," he claims.

Most metals tarnish in air to such an extent that the emissivity of the majority of commercial products is quite high, he pointed out.

"Aluminum, however, on exposure to the atmosphere, forms a very thin oxide coating which protects it from further attack and which does not appreciably decrease its emissivity.

"Consequently, under ordinary circumstances, the insulating properties of insulation formed by defining air spaces with aluminum should be relatively permanent," he believes. "The metal is ductile and can be formed commercially in very thin sheets," he recounted.

Two sizes of hot-plates were used in experiments made by the Battelle institute. One was 4 in. square, surrounded by a 2-in guard ring, while the other was 20 in. square, with a 2-in. guard ring.

During the course of the investigation, many methods were studied for installing foil in insulating units, Mr. Gregg reported. Most of the units were formed from plates made by mounting bright aluminum foil on both sides of paper or cardboard. It was found, however, that substantial units could be made from unmounted foil, he told the refrigerating engineers.

"Many types of separators were tried, and it developed that although a small proportion of the space was occupied by the separators, the use of a material of high thermal conductivity apparently increased the conductivity of the unit," he said.

"Wooden separators appeared more satisfactory than cardboard separators because of the lower heat conductivity of wood," he stated.

He explained that rigid units with low conductivity and low weight could be made with separators of wood about 1/16 in. thick, forming a lattice-work. Assemblies from 1½ to 3 in. thick were tested in the Battelle experiment.

Results of the tests proved to Mr. Gregg that effective insulation can be produced by spacing foil to form one-half inch air layers, and that the weight of the insulation can be decreased by using unmounted foil and possibly thinner separators.

Embossed foil was also tested on the hot-plates, giving somewhat higher conductivities than the parallel sheet construction, he pointed out. Thermal conductivities of units made with embossed foil were offered as follows:

Layers of Crumpled Foil Per In.	Conductivity Btu/hr/ft²/in/°F.	
	Foil .00023 In. Thick	Foil .00035 In. Thick
1	0.42	0.41
2	0.36	0.37
3	0.32	0.37
4	0.34	0.35
5	0.37	0.35
6		0.35
7		0.37

Concluding his paper, Mr. Gregg said a rigid unit made of foil sheets held one-half inch apart by wood separators was found to weigh less than 3 lbs. per cu. ft., and to have a thermal conductivity of 0.25 B. t. u. for an average temperature of 100° F.

"Emissivity of commercial foil with respect to room temperature radiation was about 5 per cent that of black bodies, and the emissivity changed but little with age except when the sheets were exposed to the most corrosive conditions," he concluded.

Comments of Edgar C. Rack, Johns-Manville sales engineer, presented by C. H. Hall of New York City, substantiated Mr. Gregg's conclusions, but pointed out that expansion and contraction of crumpled aluminum foil used for insulation introduce a variance in conductivities because of the changing number of contact points between adjacent foil. He also stressed the importance of the personal factor in applying the crumpled foil.

Effect of Sheet Size

Mr. Derr then asked what difference the size of the insulating sheets made in conductivities. Mr. Gregg answered that with one-half inch spacing there was no apparent change affected by the size, but that with one inch spacing there is some difference with larger sheets.

G. T. Pearce, Dry-Zero engineer, asked about the corrosion effects, and was answered by Mr. Gregg's claim that weathered aluminum foil had practically the same emissivity. "Moisture sealed between the sheets, however, will seriously affect the life of the insulation," he said.

BALTIMORE FRIGIDAIRE CO. HOLDS SERVICE SCHOOLS

BALTIMORE—Under the sponsorship of the Baltimore branch of the Frigidaire Sales Corp., service schools were conducted at the branch's headquarters at the Candler building, Baltimore, and at its Washington office under the direction of V. Bookhout of the service department of the Frigidaire Sales Corp., Dayton. Day and night sessions were given, which were attended by about 50 service men both in Baltimore and in Washington.

DR. EWELL TALKS ON STORAGE IN EUROPE

CLEVELAND — Impressions of an American visitor to European cold storage plants were given before the assembled A.S.R.E. members at their annual convention in Cleveland by Dr. A. W. Ewell, professor of physics of the Worcester Polytechnic Institute, who has spent considerable time before, during, and after the World War visiting cold storage plants in England, Holland, Denmark, Germany, and Austria.

"Many of the European plants are equal to American plants in layout and general efficiency," he said, "and some have devices seldom found in this country."

A new cold storage warehouse recently completed for the Polish government on the Baltic Sea was remarkable to him for its ingenious safety devices and design refinements such as very small elevator clearances. This plant was constructed by Belgian and French engineers, he continued.

No Automatic Sprinklers

"I never saw an automatic sprinkler system in a European cold storage plant," he said, explaining that serious fires are rare in Europeon plants.

One of the strongest impressions received by Dr. Ewell was the general practice of cooling plants with circulated air.

"The air is cooled by direct expansion of a refrigerant in bunkers and circulated at a minimum air speed of two to three meters per second, humidities being controlled closely by brine dripping over the coils," he said.

More attention is given to humidity control and less to temperature regulation in Europe as compared with American methods, he observed in his visits.

Use Accurate Instruments

"Accurate instruments, such as the aspiration psychrometer are employed, and in some instances cold storage installations provide for reading humidities at diverse parts of the building in a central station. Electric currents proportioned to relative humidities produce accuracies of one per cent by using resistance thermometers connected up with a Wheatstone bridge," he stated.

The use of ozone is much more general in France than here, he declared, largely because laboratory results have convinced the French of ozone's beneficial affects.

Ozone Machines Like Ours

"The ozone machines resemble ours," he continued, "although the use of higher frequencies, such as 50 cycles is more common. Ozone yield from a machine can be practically doubled by increasing the frequency from 50 or 60 to 500 cycles," he maintained.

He next described briefly the European practices in storing meat.

"After being dressed, meat is placed in a room holding temperatures from 32 to 34° F., with high ozone content, and kept from 12 to 18 hours. It is next put in a 31° F. room with low ozone content, and ripened for about two months," he explained.

In Germany the criterion for good meat is that the colonies of bacteria must not exceed 3,000,000 per sq. in., he pointed out.

Storage of Eggs, Caviar

Eggs are carried at 32 to 34° F. temperature with relative humidities of about 85 per cent, he explained. They are carefully packed, and well inspected.

"Caviar, mushrooms, and salmon are regularly preserved in European plants," he said, "the caviar being packed in 2-qt. wooden barrels which are set in tubs and surrounded by ice—until it is sold at a price of about $5 per lb."

Tomatoes are carried for two months at 32° F. with high humidity and high ozone content. Furs are kept at 50 to 60° F. with high humidities, he related.

"The Ottesen method of quick-freezing is being used to an increasing extent in Europe, especially in freezing fish," he mentioned in conclusion.

Claude A. Bulkeley, chief engineer of the Niagara Blower Co., expressed interest in the attention Europeans give to humidity control, and opined that American cold storage operators are also becoming more concerned with the subject of humidity.

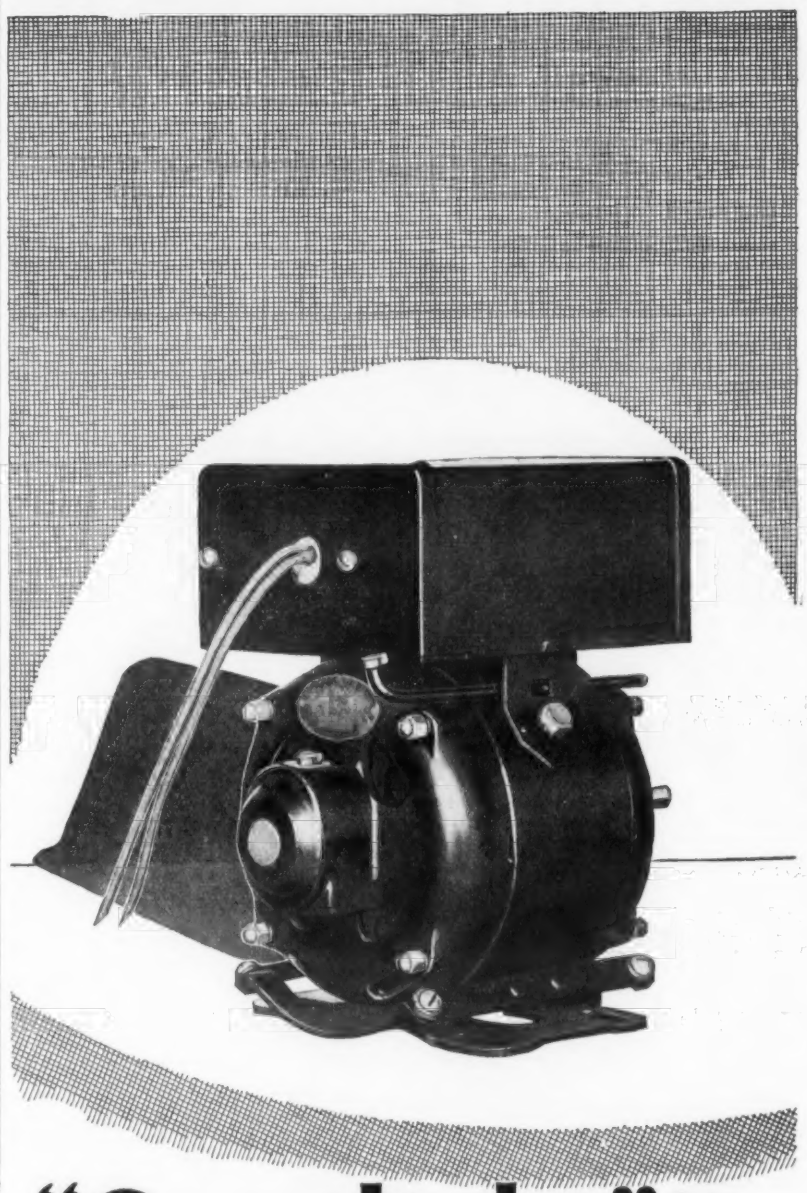
NEW COMPANY TO MARKET CANE BUILDING MATERIAL

SAN FRANCISCO—Hawaiian Cane Products, Ltd. has entered the building material field, and is placing on the market a cane fiber structural insulation under the brand name "Canec." The concern has just completed the erection of a modern manufacturing plant at Hilo, Hawaii, where its product will be manufactured.

Head sales offices are maintained at 215 Market St., San Francisco, with eastern sales offices at 165 Broadway, New York City. Walter G. Stromquist has been appointed eastern sales manager and will make his headquarters in the New York office.

Canec consists of the usual popular sizes of board from ½ in. to 1 in. thick, as well as insulation lath, it is announced.

G-E TYPE KC



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210-159

GENERAL ELECTRIC

Copeland Executive Talks on Production Machines

HUGHES GIVES HINTS ON TOOLING A SHOP

CLEVELAND—Economic production of refrigerating machines on a continuous basis is a much different problem than building just a few units, and requires greater specialization of machinery, if low manufacturing costs are to be attained, Edward Hughes, vice president in charge of production of Copeland Products, Inc., told the first A.S.R.E. session.

It is a mistake to tool up the entire plant on one production basis, he declared, pointing out that in building one machine which may never be duplicated, and even in producing small job lots of odd sizes, that lowest manufacturing costs can often be achieved without extensive special tooling.

The average production man who is responsible for tooling in any present day shop is familiar with a number of different ways of tooling up any item which has to be placed in production, Mr. Hughes observed.

"It will be found that he frequently considers a number of different methods of tooling before deciding on the definite one to be used for any given job. In the light of this knowledge, it is surprising that the economics involved are not given more intelligent consideration," he declared.

"A good job of tooling is generally considered to be that by which the part is produced for the least possible direct labor, while as a matter of fact this frequently proves to be the most expensive way of producing the part.

"The figures of the cost department or estimating department, where one is maintained, are generally used in arriving at a conclusion regarding production methods. Such figures are generally made up by throwing all tool costs into a burden account and distributing it uniformly over the direct labor. This procedure may give a very inaccurate picture on an individual part," he stated.

Mr. Hughes pointed out that there is some tendency for each shop to specialize in one particular class of tooling, and to tool practically everything in that shop according to the accepted standards.

"This practice disregards entirely the fact that in almost every case there will be found a wide variety in the total production quantity involved.

"A much truer picture can be obtained by considering various classes of tooling that might be used for the part under consideration, and figuring comparative costs on the basis of direct labor plus the distributed tool cost—which is obtained by dividing the total cost of tooling by the estimated quantity that will be required. This method disregards entirely the other burden items which would not be affected," he said.

"This determination can be made much clearer graphically," he said, referring to the chart reproduced above.

He explained that he had taken one definite part, figuring the cost of tooling it up in four different ways, and estimating the cost of production by each of the methods:

Class A involves the use of $15 worth of simple tools and would result in a direct labor cost of $1.20 per unit.

Class B involves the use of $500 worth of tools, by the use of which the direct labor cost will be reduced to 30 cents per unit.

Class C involves somewhat more elaborate tooling, costing $1,000 and reduces the direct labor cost to 10 cents per unit.

Class D is estimated for tooling made as near fully automatic as possible, and will cost $5,000, and reduces the cost for direct labor to the small sum of 2 cents per unit.

In charting the combined costs for direct labor and distributed tool expense, it is obvious that the direct labor cost is a horizontal line as the cost of manufacturing by each class of tooling would not vary with quantity, and the set-up time involved is not a part of this consideration, he explained.

The distributed tool expense, which is obtained by dividing the total expense by the quantity under consideration, represents a curved line super-imposed on the direct labor cost line and approaching tangency to it as the quantity increases, he continued.

"It becomes apparent from this chart that the points of intersection of these curved lines represent the economic limits for any given class of tooling, and show for the case assumed that for quantities of less than 400 it is cheaper to use the very simple tools and spend $1.20 each for direct labor.

"For quantities between 400 and 2,400, Class B tooling will represent the lowest overall cost, while Class C tooling will be economical for quantities between 2,400 and 50,000. The Class D tooling, which gives us the 2-cent direct labor cost, is not economical unless more than 50,000 parts will have to be made," he reported.

It is sometimes hard to convince a production man, who has worked out a system of tooling which will result in very low labor cost, that it may be more profitable to produce these parts at a labor cost many times as great, but involving a reduced tool expense. This fact can generally be made very clear by the use of a chart such as the one outlined, and careful attention to this matter will generally result in a tremendous overall saving and will also give a much more accurate cost picture, he maintained.

"This will eliminate the possibility, which now exists in most plants, of quoting a price too low on small production items, and making them disproportionately high on large production jobs—which are made to bear the expense burden which should be absorbed by the small quantity items," he declared.

When the tooling is laid out, it is necessary to establish definite lines of authority, and to fix the duties of the various operators, he showed.

The engineering department usually determines inspection standards which are held by workers using amplifying devices which make a tenth of a thousandth of an inch look big. Often temperature corrections must be made when parts get warm and expand, he told the engineers.

To reduce handling in the Copeland plant, material progresses systemically through receiving, inspection, subassembly, assembly, installation in the cabinets, another inspection, and to the shipping department, he reported, illustrating his talk with lantern slides.

Any plan of wage payment is fair accordingly as it is based on sound accurate time studies and intelligent motion studies, he averred.

"Workers in the Copeland plant are promised that piece-rates will not be cut just because they increase their production," he said.

Presenting written comments on Mr. Hughes' paper prepared by F. E. Nehrbas, Servel vice president in charge of production, C. H. Tanger of Servel stated that one of the major production problems has been to adopt general purpose machinery to single purpose machines for refrigeration manufacture. He also urged that more production papers be presented in A.S.R.E. programs.

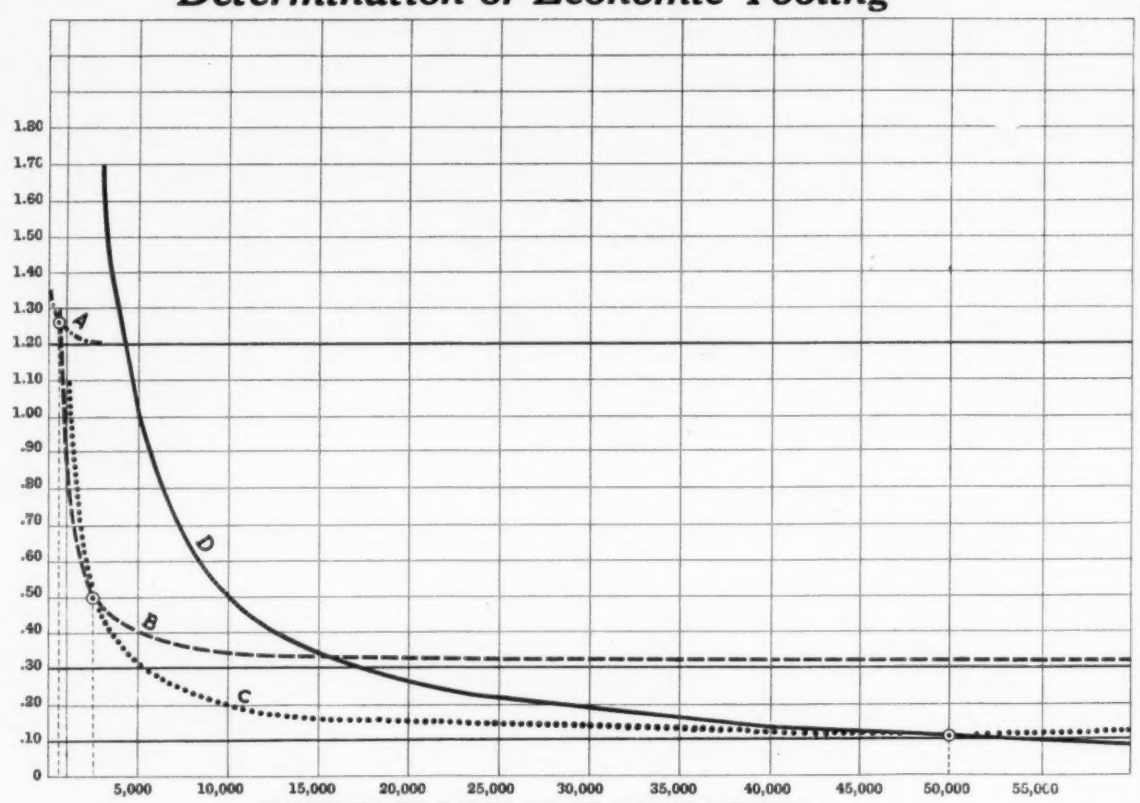
S. H. Shipley, engineer from York Ice Machinery Corp., asked Mr. Hughes to what extent parts are interchangeable. Mr. Hughes replied that some parts are entirely interchangeable, while others are not.

The installation of precision equipment such as a new diamond boring machine in the Copeland plant is aiding interchangeability, and also reducing rejections and scrap, Mr. Hughes explained.

H. H. Bruns asked if any attempt is made to gauge all parts at the same temperature.

Mr. Hughes reported that hot parts are cooled before gauging. In winter parts are kept at shop temperatures easier than in the summer, he stated.

Determination of Economic Tooling



To illustrate his method of ascertaining lowest production costs, Mr. Hughes has taken one part as an example to show when additional quantities justify additional tooling. The chart is explained below.

LAB CONTROL HOLDS TANK TO WITHIN .015°

NEW HAVEN, Conn.—To maintain a constant low temperature with a small electric refrigerating machine, Gosta Akerlof and H. W. Foote of the department of chemistry, Yale University, have developed a thermostatic arrangement which will hold a 450 liter tank to a temperature variation of .015° or less.

A ¼-hp. Kelvinator condensing unit is used to cool the 60 ft. of copper cooling coil in the tank, and is controlled by operation of an electrical circuit shown in the diagram below.

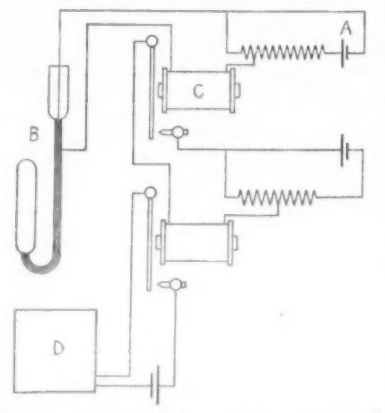


Chart of accurate temperature control.

The direct current potential, at A in the figure, forces a small current through the 750 ohm fixed resistance. Approximately 5 milliamperes are tapped off this resistance by a potentiometer system, opening and closing the small relay C according to the dictates of the toluene-mercury regulator B.

"The small relay C was not capable of carrying the current necessary for the compressor," Mr. Foote says, "so a second relay was employed to start and stop the refrigerating machine (D in figure) by passing sufficiently heavy alternating current."

Agitation of the solution in the tank is secured by constant operation of a motor-driven stirring equipment consisting of two stirrers. Unless exceedingly close temperature control is needed, only one stirrer is used, according to Mr. Foote.

The tank is lined with tinned copper, and is insulated with two layers of Insulite between the metal and the wood. The cover is built in sections so that part of the tank can be uncovered without undue heat exchange with the surroundings.

"The shorter the operation periods of the machine, the more constant the solution temperature will usually be," Mr. Foote said. "On the other hand, the longer the periods, the less starting strain will obtain in the motor."

With very efficient stirring of solutions at 6° C., he reported that the machine ran for three minutes and remained idle for a somewhat longer time. The temperature under these conditions did not exceed plus or minus .015°, and usually within .01°.

HEAT TRANSFER TOPIC OF HURKILL'S PAPER

CLEVELAND—In estimating heat transfer through a refrigerator car wall, the temperature difference from surface to surface should be known, according to W. J. Hurkill of the U. S. Bureau of Agricultural Engineering, Washington, D. C., whose paper was read at the A.S.R.E. convention here by A. W. Oakley of New York City, vice president of the society.

"If only the difference between air temperatures near the inside and outside surfaces is used, and a coefficient of the surface resistance applied, the results may be misleading, owing to the effect of radiation," Mr. Hurkill pointed out in his paper.

To provide some data for the determination of thicknesses of insulating materials for refrigerator cars, the bureau conducted a series of tests in various parts of the country.

Four tests were made, two in stationary cars, and two on cars in motion. The first stationary test was conducted at the Arlington Experiment Farm, Rosslyn, Va., on a refrigerator car owned by the Department of Agriculture. The car had no load, and was tested with and without ice in the bunkers.

The second stationary test was made in Los Angeles on a privately owned car. The car also had no load, and was tested without ice because the first test indicated that outside surface temperatures were little affected by refrigeration in the car.

The tests on moving cars were made on cars loaded with lemons, without ice, travelling from San Dimas, Calif., to New York. Temperature readings were taken en route.

In all of the tests, temperatures at a number of points on the outside surfaces were taken, and in the first test inside surface and air temperatures were also recorded, Mr. Hurkill explained in his paper. Single-junction thermocouples were used, being read with a potentiometer.

Temperatures of wooden surfaces were read by making a shallow slit along the grain of the board, and inserting a thermocouple to a depth of 1-16 to 18 in. The wood was then pushed over the slit so no metal was exposed to the air.

The outside surface temperatures of a refrigerator car and the consequent heat penetration into the car are materially affected by solar radiation, Mr. Hurkill observed, showing by charts how the sun's radiation varies in different parts of the country at various months of the year.

The color a car is painted is another important factor, he pointed out.

"If a roof were painted with titanium white, the temperature of the roof would be reduced 7 to 8° from that on a red roof, he claimed, although weathering and dirt accumulation would reduce this advantage. If titanium white can be used successfully for painting car roofs, the resulting reduction in heat transfer will be equivalent to the addition of a material thickness of insulation," he stated.

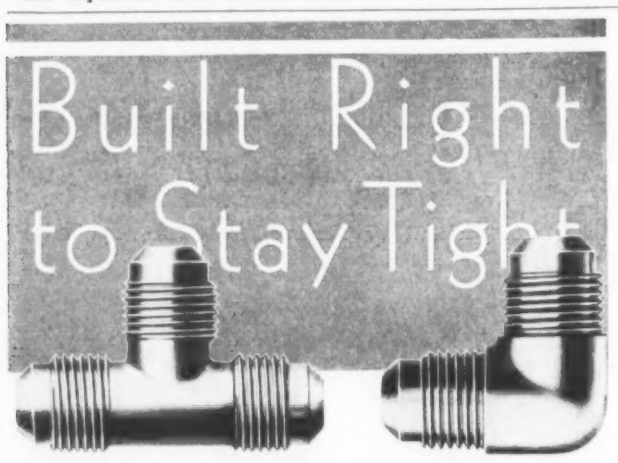
With a knowledge of approximate surface temperatures of the various parts of a car, it is possible to estimate the most economical distribution of insulation in the walls, roof, and floor of the car, he averred.

"It can be shown that for the most economical use of insulation, the thickness of insulating material on each wall, end, roof, or floor should be proportional to the square root of the temperature drop through the surface times the conductivity of the insulating material used, and inversely proportional to the square root of the total cost of purchase and installation per board foot of material used in the surface," he stated.

Results of his tests indicated that inside surface temperatures will largely depend on the loading temperatures of the commodities carried, while outside surface temperatures will depend on the climate through which the car moves.

A refrigerated car using natural air circulation will have a ceiling temperature several degrees higher than the floor temperature, and the inside surface temperature of the end walls will be somewhat lower than that of the side walls, he observed from the tests.

The outside surface of the roof will average several degrees warmer than other outside surfaces, he concluded, while outside surfaces of the side walls will be somewhat higher than those of end walls, and outside surfaces of the floor and end walls will average about the same as average outside air temperatures.



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Much Technical Work Precedes Faraday Announcement

Experiments of Faraday, Carre', Keyes Aid General Motors' Design

By John T. Schaefer

DAYTON—Investigation of several absorption refrigeration principles, and testing of many materials preceded the introduction of the Faraday gas-operated refrigerator, Harry Smith, Faraday engineer connected with the General Motors Research Laboratories, recently pointed out in tracing the Faraday development work.

The scientific studies which preceded the General Motors engineers activities date back about 110 years to Michael Faraday who is credited with the first liquefaction of ammonia by heating silver chloride in one end of a sealed glass tube, and cooling the ammonia gas driven off until it condensed, according to Mr. Smith.

The phenomenon of cooling which the boiling of ammonia produced when the pressure was reduced was not regarded by Faraday as significant, but as a curiosity, he relates. Mr. Smith points to Faraday's experiments in Sir Humphrey Davy's laboratories as the first refrigeration—and that by an absorption method using a solid absorbent.

Early Machine in Civil War

These discoveries were not applied for refrigeration until about 1850 when Ferdinand Carre, a French scientist, used them in an ammonia absorption machine which was subsequently brought over to this country to supply ice for the Confederate soldiers during the Civil War.

No particular progress was made in absorption refrigeration for household use, however, until 1912 when Gebhardt conceived the idea of employing partial pressures instead of two pressures—a method which was not capitalized upon immediately because of the World War.

Carl G. Munters and B. C. von Platen, Swedish engineers, were next to add to the intermittent string of contributions, adopting Gebhardt's suggestion in a practical household refrigerator.

Work of Dr. Keyes

Also Dr. Fred G. Keyes of the Massachusetts Institute of Technology became attentive to absorption refrigeration, studying the action of ammonia chloride, according to Mr. Smith, Dr. Keyes pointed out that definite succession of compounds were formed as the ammonia compounds are heated.

The discoveries were incorporated in patents which were later acquired by General Motors, but which did not prove commercially successful, Mr. Smith reports.

"Why did General Motors elect to use a solid absorbent instead of the aqua method?" he queried, and explained the decision with four reasons:

1. The aqua method was well-known, and they wanted something different, if possible.

2. Just as dry sulphur dioxide doesn't corrode common metals, so anhydrous ammonia will not corrode most metals, whereas aqua ammonia will, he stated. Zinc is the chief metal that anhydrous ammonia will seriously affect.

3. A large range of absorbent materials is available to choose from, giving a large range of possible temperatures. Also several refrigerants other than ammonia can be used with a solid absorbent.

No Rectification Necessary

4. No rectification is necessary with a solid absorbent, hence the absorber can be placed in any space relationship with the evaporator, and a remote installation can be made with only one piece of ¼-in. tubing for a connection.

Mr. Smith classifies the major problems faced in making the machine practical as: 1. Arranging to heat and cool the absorbent material rapidly and uniformly; 2. Stabilizing the absorbent—accommodating the expansion and contraction; 3. Developing suitable controls; and 4. Incorporating all the requirements into a design that is susceptible to economic production.

The solution to problem number one was aided by the use of a steam jacket which permits uniform heating of the absorbent at 212° F., and evenly distributes the heat of the gas through steel cooling fins on the outside of the absorber, he points out. Hydrogen welding of copper is employed to fasten the pieces of the absorber, since copper is inactive with water-free ammonia.

In seeking to accommodate the expansion and contraction of the absorbent it was found that lithium nitrate forms gummy compounds with ammonia which are viscous throughout the entire range of temperatures and pressures applied to ammonia in the absorption cycle, so lithium nitrate is used to bind the absorbent (strontium chloride) in the absorber, Mr. Smith stated.

Action of Absorbent

The heating cycle starts with about 40 per cent of voids in the absorbent, he explained, a proportion which increases as the ammonia is driven out until the material probably resembles popcorn, the lithium nitrate acting as the molasses or cement to prevent collapse.

To design suitable controls for the refrigerator, the engineers needed metal bellows or packless valves which would withstand high pressures and which contained no zinc. Spring-tension zinc-free phosphor bronze proved to be an answer in this case, Mr. Smith showed, because a sylphon of that material can take a 600-lb. test without losing its tension, and stands 1,000 lbs. without breakdown or leakage.

Two service valves were incorporated into the Faraday refrigerator, one on the absorber, another on the evaporator. By using a spring loading device on the evaporator, Mr. Smith claims to secure automatically an even vapor pressure in the evaporator which can be varied only by the temperature regulator.

Although the Faraday engineers believe the continuous absorption is better for industrial systems, they found the intermittent cycle more suitable for their domestic refrigerator. A temperature range inside the food compartment of less than three degrees is claimed.

Control of Cooling Water

"Cooling water for the absorber is controlled by a thermostatically operated bronze water valve placed in the cold water supply line," Mr. Smith said. "At the end of each heating cycle, the absorber is flushed out and cleaned with cold water."

Strontium chloride for the absorbent is purchased in the hydrated state, he showed, and is manufactured in the Faraday plant by the batch process. Original methods such as used by Dr. Keyes took 36 hours to complete a batch, now a batch can be run through in 1½ hours, and may sometime be made continuous, he explained.

One of the major design problems was to protect the absorber from loss of heat. Ceramic, asbestos, and various iron jackets were tried, but aluminum proved most satisfactory because it reflects the radiant heat. Copper was tried, but oxidized to a black color, while aluminum acquires a protective coating with age, he declared.

"Requiring higher pressures, an ammonia evaporator must need stronger parts than other common refrigerants," he pointed out, "so the latest Faraday evaporator is formed of one piece of sheet steel, stamped out in one operation by a special 2,000-ton hydraulic press."

The Faraday evaporator is fabricated with 540 welded contacts, applied 18 at a time by an automatic feed electric welder. The cooling unit is tested at 1,000-lb. pressure, and then porcelain enamelled.

Designed for Production

In designing the refrigerator, Faraday engineers sought materials that lent themselves to easy and economic fabrication in punch presses and automatic screw machines.

Explaining briefly the operation of the Faraday machine, Mr. Smith showed how heat is applied to the absorber automatically by the gas burner when the system pressure falls to a certain point; the heat drives off the ammonia which is condensed and enters the evaporator to produce refrigeration.

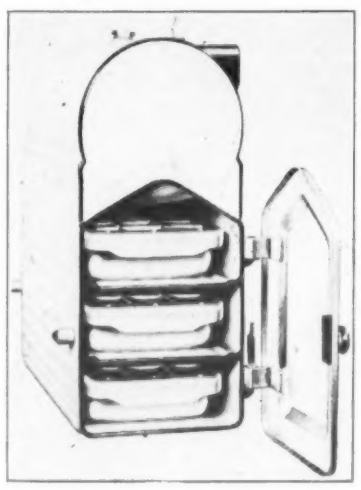
When the pressure drops to 160 lbs., the heat cycle is finished and the ammonia, having free entrance to the absorber, returns to it. To take back the ammonia, the absorbent is cooled to about 110° F.

Congealing liquid, a 5 per cent alcohol solution, in the evaporator jacket provides continuous refrigeration, he claims.

Chief Engineer

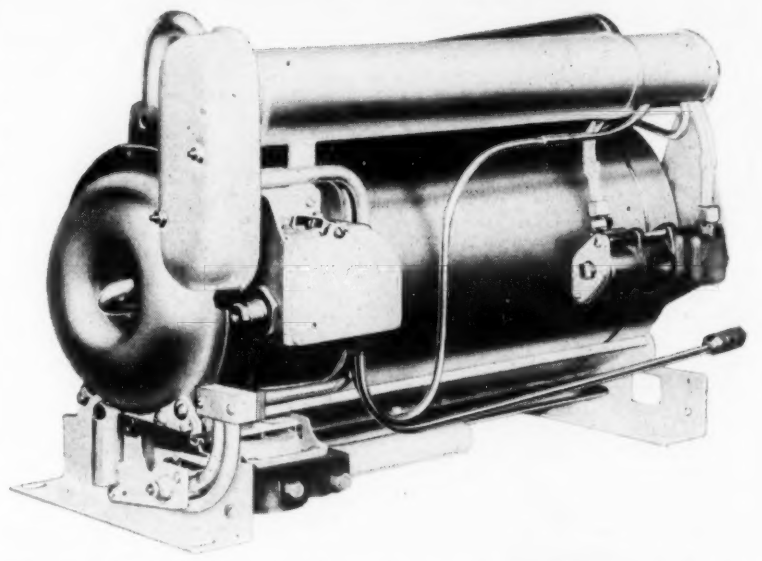
HARRY SMITH
Developmental engineer on the new Faraday refrigerator.

Cooling Unit



Porcelain finished steel evaporators have been designed for Faraday.

Faraday Absorber



The Faraday absorber may be used in a remote installation, or in any other space relationship with the cooling unit, engineers claim.

When asked about remote installations, Mr. Smith reported that the absorber unit can be placed in the basement of a home, and in fact is even simpler in some instances because only a ¼-in. tube need be run from the absorber to the cooling unit, keeping the water, gas, and sewer connections in the basement and limiting the products of combustion to the basement.

FARADAY BEING TESTED BY PEOPLES GAS CO.

CHICAGO—The new Faraday gas operated absorption refrigerator is being tested by the Peoples Gas Light & Coke Co., which plans to market the refrigerator in the Chicago area.

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The Business Newspaper of the Refrigeration Industry

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Absorption Refrigeration

ALWAYS a potential source of important competition to the compression machine, and, since the active salesmanship of Electrolux, a real fact of competition in the household field, the absorption refrigerating machine has kept the interest and respect of the refrigeration industry even though its count of numbers in service has not been particularly impressive.

Now comes General Motors with its Faraday design worked out, production tooling about complete, with plans to market it extensively through the gas utilities, and Silica Gel with an air conditioning outfit that officials of the company believe will find favor among home owners.

Absorption refrigeration again enjoys the limelight of trade paper announcements, and crystallizes the attention of many engineers and executives of companies with which the new products will compete.

Industrial Uses

For certain industrial uses, absorption refrigeration machines have been used to a considerable extent, particularly where an ample supply of cold water was available for the condenser, and where either a low-priced source of fuel was near or a supply of low-pressure exhaust steam could be utilized from other processes.

The Carbondale Machine Co., for instance, has been especially active in the manufacture and sale of industrial absorption equipment, installing it for air conditioning and general refrigeration loads in large buildings such as hotels in which a hotel-owned power generating system offered exhaust steam throughout the year.

Also in oil and coal mining regions the absorption system appears to be well-suited to provide large refrigeration loads because the fuel can be burned at a low cost.

Household, Small Commercial

In the field of small commercial and household refrigeration, a good many absorption designs have been proposed, but few have been incorporated into machines and sold on a commercial scale.

The "Stator" machine, using mercury vapor as the driving force, has held some interest among the engineering profession for its unique operating principles.

The Crosley "Icy-Ball" has found a market in export trade and among the rural communities where electricity is not available, while Perfection Stove's oil burning absorption unit finds a degree of acceptance in that large market for refrigeration among non-electrified farms.

The *adsorption* system of refrigeration using Silica Gel has been widely discussed for both household and commercial machines. Several large commercial and industrial installations are operating in Baltimore, the home of Silica Gel, and a number of process industries requiring very dry air are using Silica Gel. Little is known of present plans to apply this type of refrigeration to household machines.

The growth of domestic air conditioning represents a great promise to the proponents of Silica Gel. The manufacturing organization, cooperating with the American Gas Association, has conducted several experiments with gas-operated Silica Gel air conditioning units, and displayed an outfit at the Heating and Ventilating Exposition two weeks ago in Cleveland which produced dry, cool air.

Electrolux has been the predominant factor in household absorption refrigeration up to the present time. Brought over from Sweden in 1925, the Platen-Munters design was adapted to American tastes and introduced to the market here in 1927 in two models.

Electrolux Growth

The Electrolux line was extended to six models in 1928, 10 in 1929, 13 in 1930, while last year saw the introduction of ice cream cabinets. Extensive advertising and sales programs popularizing "freezing by heat" and the lack of moving parts have contributed to the public acceptance of this machine.

It is interesting to note that the Electrolux is being used as an *electric refrigerator* in certain parts of Canada where power rates are low, by employing an electrical resistance for the heating element.

Now the Faraday

To cultivate the gas market, General Motors has just announced three models of the Faraday refrigerator. Differing from the Electrolux in that it employs a solid absorbent and operates on an intermittent cycle, the Faraday can be installed with the absorber in any space relationship with the evaporator, its designers point out, thus making it suitable to remote installations.

Increased activity in the design and sales of absorption refrigerators indicates an appreciation of the unusual characteristics of the absorption cycle, and can be expected to encourage more widespread utilization of all types of refrigeration.

GLEANINGS
FROM RECENT PERIODICALS

PRECISION GRINDING

NINETEEN THIRTY-ONE has been characterized more by a steady and continuous refinement of previous achievements than by the introduction of radically new methods. One thought which has actuated much of the work which has been done is the realization on the part of the manufacturers making high quality products that the question of finish is very closely associated with that of permanent accuracy, or in other words the more permanent maintenance of the original limits of accuracy.

One large manufacturer of an extremely popular household appliance has instituted a system of selective assembly to limits of 0.0001 in., and the long run guarantee which is given in respect to the functioning of this appliance, and in respect to which noise and wear would be fatal, has automatically brought the question of finish under the most critical review. While it has always been recognized by progressive manufacturers that a well-balanced scheme of tolerances is essential to easy and, therefore, cheap assembly, thorough examination of mechanical components subjected to an intensified wearing test has provided convincing evidence that noise, gas tightness and continuously correct functioning are factors of tolerance control. These, in turn, assuming that the design is adequate, are factors of finish control.

To satisfy the exacting demands of the present-day discriminating buyer, the domestic refrigerator, the automobile, the washing machine, the Victrola, the vacuum cleaner, the sewing machine and the hundred and one other mechanical household appliances—all of these things must operate practically without noise.

Then again, in the broader field of application served by mechanical devices, the feeling has been growing that noise almost invariably means wear, and wear in any form is economic waste. Always assuming that the problems of design have been adequately dealt with, the thought has grown and been accepted as fundamentally sound, that noise and wear in a large measure are preventable and in many cases almost entirely controllable by the accuracy with which the final sizing or finishing operations are performed.

Realizing this trend of the thoughts of the manufacturers and users, both the makers of precision grinding machinery and grinding wheels have redoubled their efforts in an endeavor to perfect their appliances and products.

The control of accuracy in manufacturing, or rather the sizing of work reliably between predetermined limits of accuracy, has progressed under the impetus of economic pressure. The automatic compensation for grinding wheel wear in cylindrical grinding is now an accomplished fact, and quite a large number of manufacturers have installations fitted with this type of equipment.

The grandual disappearance of highly skilled operators, whose judgment and experience in the past have enabled them to produce work within close limits of accuracy, has called for and produced a mechanical substitute which will function with unfailing reliability. In some cases the installations are entirely automatic, the work after it leaves the machine passing under a sizing finger, which automatically registers when the work is produced oversize due to grinding wheel wear, and which at the same time switches in a combined electrical and hydraulic circuit, which, through the aid of mechanical members, automatically compensates on the grinding wheel adjustment for the exact amount of oversize.—R. E. W. Harrison, Cincinnati Grinders, Inc., in *Iron Age*, Jan. 7, 1932.

Cleveland Technical Sessions Attract About 300 Refrigerating Engineers

CLEVELAND—Approximately 300 refrigerating engineers, representing practically every important organization in the refrigeration and air conditioning industries, attended the technical sessions of the 27th annual convention of the American Society of Refrigerating Engineers, Jan. 25 to 29.

As reported in stories throughout this issue, many important problems were discussed in the daily sessions.

Refrigerating engineers present included the following:

R. C. Allen, East Pittsburgh; A. F. Anjeskey, Wickliffe, Ohio; W. H. Armstrong, Brooklyn; L. W. Atchinson, Schenectady, N. Y.; E. W. Atkinson, Chicago; W. H. Aubrey, Waynesboro, Pa.; W. J. Aulsebrook, Evansville, Ind.; R. W. Ayres, Schenectady, N. Y.; R. M. Babbitt, Chicago; A. H. Baer, Waynesboro, Pa.; Clarence P. Baker, Pittsburgh.

C. T. Baker, Atlanta; P. W. Baker, St. Louis; E. L. Barnes, Buffalo; C. Austin Beck, Cleveland; N. T. Beck, Philadelphia; C. F. Belshaw, Indianapolis; R. H. Beman, Detroit; F. M. Bennett, Pittsburgh; J. H. Benson, Salem, Ohio; J. G. Bergdoll, York, Pa.; C. W. Bilbe, Norwood, Ohio.

George Bright

E. M. Boat, Poughkeepsie, N. Y.; W. K. Bock, Cleveland; C. W. Bondurant, Cleveland; M. F. Booth, Salem, Ohio; H. J. Botchford, Buffalo; G. B. Bright, Detroit; R. T. Brizzolara, New York City; H. H. Bruns, New York City; J. C. Buchanan, Detroit; C. A. Bulkeley, New York City; P. H. Burkhart, East Pittsburgh; R. J. Bush, Kansas City; E. D. Campbell, St. Louis.

J. T. Card, Chicago; J. M. Carter, Buffalo; J. R. Chamberlain, York, Pa.; B. Chapple, Middletown, Ohio; Y. W. Chevver, Holland, Mich.; N. G. Clark, Middletown, Ohio; F. M. Cockrell, Detroit.

J. Collins, Cleveland; W. D. Collins, Evansville, Ind.; A. W. Conklin, Riverhead, N. Y.; W. Sweezy Conklin, Riverhead, N. Y.; C. J. Conn, Smithtown Branch, N. Y.; G. E. Couciell, Cleveland; D. M. Corson, Dayton; S. H. Cowim, Dayton; T. Coyle, Niagara Falls, N. Y.; A. F. Craver, Cleveland; T. M. Cunningham, Dallas, Tex.; G. C. Curtis, Rochester, N. Y.; W. C. Davidson, No. Canton, Ohio.

J. H. Dennedy, Evansville, Ind.; R. C. Doremus, Detroit; A. P. Dougherty, Niles, Ohio; T. M. Dugan, McKeesport, Pa.; M. Dunn, Detroit; F. E. Eckert, Pittsburgh; H. D. Edwards, New York City; C. T. Elder, Cleveland; J. H. Elliott, W. Lafayette, Ind.; S. L. Elmer, Jr., New Brunswick, N. J.; J. Engalitcheff, Baltimore.

E. Erstling, Dearborn, Mich.; H. S. Estler, Detroit; E. W. Ewell, Worcester, Mass.; E. G. Fahenstock; F. L. Fairbanks, Boston; F. H. Faust, Schenectady, N. Y.; A. R. Fayed, W. Lafayette, Ind.; H. J. Findley, Cleveland; D. L. Fiske, New York City; E. R. Fitzgerald, Schenectady, N. Y.; E. C. Fogh, Kansas City; H. O. Forrest, Jersey City, N. J.; P. J. Forsyth, Cincinnati.

F. C. Geiler

L. H. D. Fraser, Cambridge, Mass.; R. T. Frazier, Chattanooga, Tenn.; F. M. Fuller, Hagerstown, Md.; Herbert George, Chicago; F. C. Geiler, Dayton; C. J. Gibson, Greenville, Mich.; C. M. Gilbert, Chicago; T. B. Gilliam, Canton, Ohio; R. O. Gooding, Norwood, Ohio.

R. E. Gould, Dayton; J. T. Gower, Cleveland; F. D. Grafton, Brooklyn; F. H. Greening, Painesville, Ohio; J. L. Gregg, Columbus, Ohio; H. C. Guild; G. Haas, Rochester, N. Y.; W. R. Hainsworth, New York City; C. H. Hall, New York City.

T. W. Halloran, Albany, N. Y.; F. S. Hamer, Dayton; W. G. Hancock, Detroit; F. Hanus, Cleveland; M. G. Harbula; D. R. Harper, Pittsburgh; Henry Harrison, New Brunswick, N. J.; H. W. Hart, Cleveland; H. C. Hayes, Detroit; D. P. Heath, Detroit.

E. P. Heckel, Chicago; Arnold J. Hecker, St. Louis; E. Heitman, Detroit; J. P. Henry, Chicago; W. H. Hibbeler, Omaha; F. W. Hicks, Detroit; W. W. Highan, Cleveland; E. M. Holcombe, Carbondale, Pa.; G. J. Hopkins, Kendallville, Ind.; C. H. B. Hotchkiss, New York City; W. B. Howard, Cleveland; H. B. Howe, Chicago; E. F. Hubacker, Detroit.

R. M. Hyde

R. W. Hull, Connersville, Ind.; G. E. Hulse, New Haven, Conn.; J. Hurley, Chicago; C. E. Hust, Ceuti, Ohio; R. M. Hyde, Detroit; Miss Margaret Ingels, Newark, N. J.; H. E. Irving, Urbana, Ill.; William Jabine, Detroit; F. H. Jackson, Cleveland; H. W. Jarrow, Chicago.

C. J. Jones, New York City; A. L. Judson, Cleveland; F. H. Juergars, Lafayette, Ind.; D. F. Keith, Cleveland; D. J. King, Detroit; W. J. King, Schenectady, N. Y.; R. E. King, Fort Wayne, Ind.; C. M. Kirch; L. A. Klages, Akron, Ohio; A. E. Knapp, Detroit; I. J. Knudson, Detroit.

J. G. Kohl; E. C. Koepke; J. V. Koubek, Cleveland; A. P. Kratz, Urbana, Ill.; W. R. Kremer, Milwaukee; C. H. Kuhlman, Toledo; G. Lange, New York City; H. Lathrop, Fort-Wayne, Ind.; H. L. Laube, New Brunswick, N. J.; F. W. Laverty, Olean, N. Y.; R. R. Leonard, Chicago; M. D. Leslie, Salina, Kan.; H. I. Lewis, Dayton; C. E. L. Lipman, Chicago.

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E. C. Lloyd, Lancaster, Pa.; R. H. Lock, Toronto, Can.; E. J. Lockwood, Peekskill, N. Y.; A. G. Loeffel, Detroit; F. I. McCandlish, Chicago; I. E. McFarland, New York City; R. H. McGeorge, Detroit; A. R. McGonegan, Washington, D. C.; T. C. McKee, Chicago; D. W. McLenegan, Schenectady, N. Y.; H. J. Macintire, Urbana, Ill.

A. E. Magher, Chicago; A. Malling, Cleveland; C. O. Malpas, Cleveland; T. W. Markham, Dayton; J. A. Martocello, Philadelphia; C. W. Marshall, New York City; E. D. Milener, New York City; F. J. Moelter, New York City; H. J. Mollenberg, Buffalo; R. H. Mollenberg, Buffalo; E. G. Morgan, Kansas City.

W. W. Morgan, Cleveland; L. S. Morse, York, Pa.; W. W. Moss, Philadelphia; R. F. Muhleman; Glenn Muffly, New York City; C. R. Neeson, Philadelphia; R. S. Nelson, North Canton, Ohio; C. R. Nicklas, Chicago; S. F. Nicoll, York, Pa.; F. Nolde, Philadelphia.

A. W. Oakley, New York City; K. Okada, Buffalo; Maurice Olchoff, Kansas City; E. Ophuls, New York City; G. B. Palmer, Jr., Detroit; E. L. Patera, Chicago; F. S. Patton, Cleveland; H. Peacock, Cleveland; G. T. Pearce, Chicago; G. G. Pearce, W. Lafayette, Ind.

T. S. Pendergast, Detroit; C. O. Petterson, Cleveland; L. A. Philipp, Detroit; E. B. Plant, Montreal, Can.; L. G. Powers, Newark; G. L. Pownall; J. F. Primm, Mansfield, Ohio; E. R. Queer, State College, Pa.; F. M. Rappold, Cleveland; O. F. Recinpke, Omaha; J. C. Reed, Urbana, Ill.; P. J. Reese, Detroit.

D. H. Reeves, Dayton; F. B. Riley, Detroit; C. P. Robinson, Mansfield, Ohio; W. R. Robinson, Niles, Ohio; L. C. Roesel, Savannah, Ga.; E. W. Roessler, Schenectady, N. Y.; C. S. Ross, Cleveland; E. C. Rosebeny, Buffalo; A. W. Ruff, York, Pa.; H. M. Rudio, Cleveland; A. T. Ruttencutter, Pittsburgh.

E. R. Ryan

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E. J. Scott, Glenn Falls, N. Y.; C. G. Segeler, New York City; W. A. Sellew, Ann Arbor, Mich.; J. S. Shaver, Cleveland; S. Sholtes, Chicago; L. W. Shutts, Detroit; L. L. Simmons, Detroit; P. Van Sitterts, Cleveland; D. E. Slabaugh, Jr., Cleveland; E. D. Smith, Cleveland; J. C. Smith, Buffalo; N. J. Smith, Dayton; R. T. Smith, Greenville, Mich.

W. S. Smith, Cleveland; S. Sogard; W. A. Steiger, Lester, Pa.; R. A. Stencel, Toronto, Can.; G. A. Stevenson, Parkersburg, W. Va.; A. R. Stevenson, Jr., Schenectady, N. Y.; F. H. Stiening, Pittsburgh; G. H. Strickland, Dayton; H. J. Stoever, Pittsburgh.

C. H. Tanger

W. F. Swezey, Detroit; C. H. Tanger, Evansville, Ind.; G. F. Taubeneck, Detroit; B. L. Taylor, Jr., Niles, Ohio; M. C. Terry, Springfield, Mass.; W. M. Timmerman, Cleveland; W. M. Tippett, Chicago; H. Torrance, New York City; G. L. Tuve, Cleveland; G. N. Unger, Cleveland.

H. B. Van Hook, Cleveland; D. R. Vanneman, New York City; D. W. Van Patten, Dayton; C. S. Van Westrum, W. Lafayette, Ind.; R. S. Vanderbush, Detroit; H. G. Venemann, Philadelphia; R. S. Venning, Cleveland; J. H. H. Voss, New York City.

F. O. Wallene, Cleveland; R. W. Waterfill, Newark; M. R. Wells; R. L. Wells, Detroit; G. W. Wheeler, New York City; H. L. Wheeler, Canton, Ohio; C. L. Whitaker, Waynesboro, Pa.; E. White, New York City; A. C. White, Midland, Mich.; N. I. Whiteley, Cleveland; J. Leonard Whiteman, Cleveland.

E. T. Williams, New York City; H. M. Williams, Dayton; O. J. Willoughby, Atlanta; F. Wilson, New York City; H. E. Winkler, Indianapolis; C. E. Yates, Cleveland; H. S. Woodard, St. Louis; C. A. Zilker, San Antonio, Tex.; F. R. Zumbro, Waynesboro, Pa.

Letters from Readers

Urges Standardization of Cabinet Ratings

Brunner Mfg. Co.
Utica, N. Y.
Feb. 1, 1932.

Editor:

We cannot help but note the diversity of methods employed in figuring cubical contents of cabinets and square feet of shelf space in the products manufactured by the various companies.

Apparently some companies figure in the cubical contents including the evaporator, others figure net food storage space, and apparently some add in the unit compartment. Shelf areas include in some cases the defrosting pan and shelf, while others include only the actual area which is usable as far as food storage is concerned.

It is our understanding that the National Electric Manufacturers Association has standardized a method of computing these specifications. We are wondering where we can secure this information.

It might not be out of line for your publication to foster the idea with all manufacturers of standardized methods of computing these figures. It certainly would be a help to the ultimate consumer who, under the present method, is not sure whether a 4-ft. cabinet is 4 ft. high, 4 ft. wide, or 4 cu. ft. capacity, net or gross.

We have followed with much interest the activities of your publication since the first issue came off the press and certainly want to compliment you on the good work you have done for the industry, individual manufacturers and consumers alike. We would be very glad to have your comments and know your attitude on the foregoing.

M. H. PENDERGAST.

Answer:

The question of standardizing the method of computing cubical contents of cabinets is the subject of an editorial in the Feb. 3 issue of ELECTRIC REFRIGERATION NEWS.

We are mailing you a copy of the N.E.M.A. Refrigeration Division rules covering cabinet specifications.

Editor.

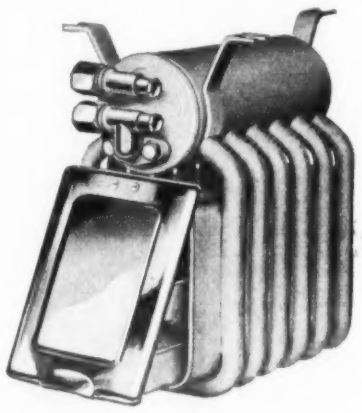
Your Development Work has been done...

but it didn't cost you ONE CENT

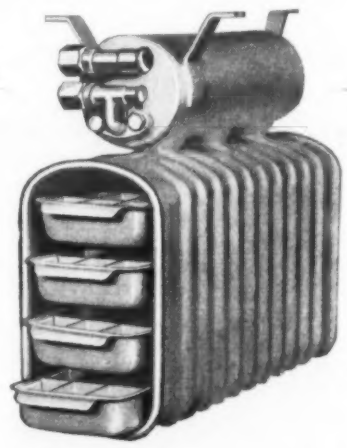
CERTAINLY this is no year to increase your development, research and production expense. It's entirely unnecessary, too . . . for Fedders has specialized for *six years* in the design and construction of quality refrigeration appliances.

Back in 1896, Fedders began building heat transfer units. Today, Fedders Standard Refrigeration Appliances are recognized as outstanding contributions to refrigeration engineering. That's why many leading manufacturers specify "Fedders". Let the Fedders engineering staff help *you* to adapt these appliances to *your* problem. You'll find the same close co-operation, working with Fedders, that you'd expect from your own engineering department . . . *plus* laboratory and research facilities that have made Fedders the leading producer of refrigeration appliances.

Here are illustrations and descriptions of a few of the Fedders Standard Refrigeration Appliances. Let us send you Technical Bulletins about these or any of the other Fedders Appliances listed at the bottom of this page. Your inquiry will be treated with the strictest confidence. And you'll be under no obligation.

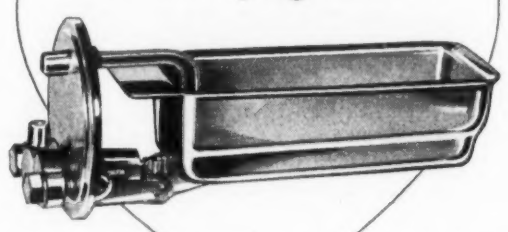


The Fedders Tube-type Flooded Cooling Unit is used by many of the leading manufacturers. It's recognized as the standard for performance and service-freedom. Constructed of non-corrosive copper and brass. Equipped with Bucket Float Assembly. Electro-tin-plated to beautiful silver-satin finish. Heavy door is chrome plated.



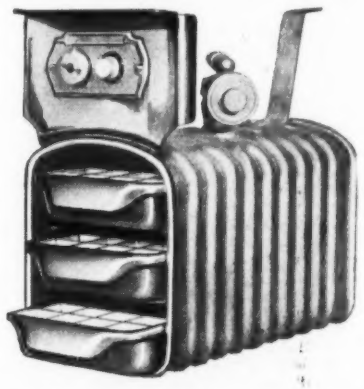
New... but exhaustively tested. The Fedders Pressed-type Flooded Cooling Unit has many important design features. Graceful, attractive shape. Compact, sturdy construction. Built for years and years of trouble-free service. Special bronze is corrosion-proof. Handsome silver-satin finish.

The sturdy HEART *of many electric refrigerators*



THE FEDDERS BUCKET FLOAT ASSEMBLY

The Fedders Bucket Float Assembly is famed for its simplicity, ruggedness, freedom from servicing. Provides positive oil return. Constructed of special metals to insure perfect operation under wide temperature changes. Needle-seat assembly is easily removed, cleaned and replaced in the field. Backed by an outstanding service record covering four years of actual operation.

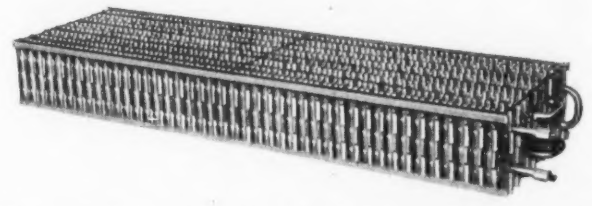


The new Fedders Pressed-type Dry Expansion Domestic Evaporator. Eye-appealing appearance combined with Fedders-quality design and construction. Can be equipped with any one of several "cold controls"... and the Fedders Automatic Expansion Valve. Smooth silver-satin finish.

• • •

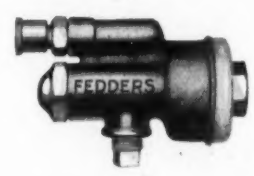
Fedders also manufactures Flooded and Dry Types of Commercial Evaporators, Ice Cream Cabinet Cooling Units, Continuous Tube Condensers, Liquid Filters and Suction Strainers, Dehydrators, accessories and fittings. Let us send you technical bulletins describing these.

FEDDERS STANDARD REFRIGERATION APPLIANCES ARE APPROVED BY THE NATIONAL BOARD OF FIRE UNDERWRITERS.

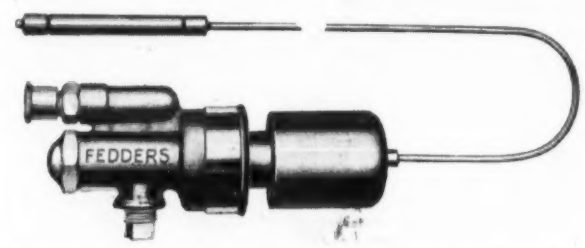


The new Fedders NON-FROST Dry Expansion Commercial Evaporators. Built in a wide range of sizes to meet any commercial requirement. Units can also be combined easily where odd sizes are needed. Vertical flue type . . . copper fins fused on seamless copper tubes, providing complete thermal contact . . . and preventing corrosion. Sturdy construction combined with trim design. Electro-tin-plated to attractive silver-satin finish. (Also available with steel tubes for ammonia).

The size of the unit contemplated should not be calculated to substantially equal the total wall area of the chamber in which the installation is to be made, but should be calculated in accordance with the required evaporator temperature, the insulating value of the chamber walls and the total wall area of the chamber.



Six years of painstaking development and thorough research have established Fedders Automatic Expansion Valve as *the* standard. The original proved design now embodies important improvements of our own engineers in addition to those of well-known consulting engineers.



Built to the same high standards . . . the product of the same development and research . . . Fedders Thermostatic Expansion Valve is also the leader in its field. Incorporates the latest design features. Enviable service record assures the user a minimum of service. Body of forged bronze.

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FEDDERS

STANDARD REFRIGERATION APPLIANCES

Fedders Appliances are fully patented and will be protected

Milener Describes Results of Tests with Gas-Fired Air Conditioners

CLEVELAND—Offering what he termed a "progress report" of the work done by the American Gas Association since its experimental gas-fired residence air conditioning systems were operated last summer in Chicago and New York, E. D. Milener, industrial research representative of the A.G.A., described the more compact system now developed, before the A.S.R.E. convention, here.

As reported fully in the Oct. 21 *Engineering Section* of the NEWS, the two test installations of Silica Gel gas-fired air conditioners were described by N. T. Sellman of the Consolidated Gas Co., New York City, before the annual convention of the American Gas Association, Oct. 14, in Atlantic City, N. J.

Progress of Gas Systems

With the operating experience gathered from these two homes, Mr. Milener explains, the system has been reduced in size and cost, and lower operation costs are now claimed.

Six factors contribute to year 'round air conditioning, Mr. Milener believes, naming them: 1. heating; 2. humidifying; 3. cooling; 4. dehumidifying; 5. cleaning; and 6. circulating.

All but cooling and dehumidifying have already been incorporated into gas-fired systems, Mr. Milener claims, and the Silica Gel system now designed produces the last two functions of complete air conditioning, in his opinion.

The system follows the plan of slight cooling with emphasis on dehumidifying, he continued, so that the upward flow method of air distribution may be employed, and warm-air ducts existing in present homes may be utilized, and so the same air distribution arrangement may be used in summer as in winter.

Emphasizes Dehumidification

Contributing also to development along the lines of greater dehumidification and less cooling, he pointed out, has been belief in the theory that a slight reduction of dry-bulb temperature and adequate reduction in relative humidity will give most satisfactory home service, and will eliminate the chilling effect found in theatres where temperature reduction has been excessive.

"Research has chiefly been directed toward independent dehumidifying and independent cooling," Mr. Milener stated. "The force of capillary attraction, using a solid adsorbent (Silica Gel), has been utilized for dehumidifying. Cooling by means of direct water coils or by re-evaporation has also been studied."

"One of the powerful forces of nature is that of capillary attraction," he went on. "The place of Silica Gel in air conditioning is to harness that force."

Capillary attraction is the force that acts when you put the corner of your blotter on a drop of ink, and see the ink flow up the blotter, he explained.

Illustrates Capillary Attraction

"Considering the pores of an ordinary sponge reduced to a billionth of their present diameter, the resulting infinitesimal pores would have capillary attraction such that they would drink in, not only water, but vapors, and under certain conditions, gases, holding them just as the sponge holds water.

"Silica Gel is a hard, glassy material with the appearance of clear quartz sand, made from sodium silicate and acid. Its chemical analysis is exactly the same as sand, silicon dioxide, but it differs in its highly porous structure, the pores of which cannot be seen because they are smaller than the wavelength of light," he explained.

Absorption Qualities

This gel will absorb 40 per cent of its own weight with no change in volume, if placed above water in a closed vessel, according to Mr. Milener. When heat is applied the water vapor will be driven out, he explained further, a cycle which can go on indefinitely.

The Silica Gel system as developed by the research committee of the A.G.A. includes two beds of gel, one to be taking moisture out of the air being conditioned, while in the other bed heat is driving out the moisture in preparation for its air-drying cycle.

Air cooling is done separately from the drying operations, he showed, and may be done in three ways: 1. by a small reduction of dry-bulb temperature with tap water which is subsequently used to cool the gel beds after moisture is removed by heat; 2. by re-evaporating water into air whose moisture content has been greatly reduced by Silica Gel; and 3. by cooling with separate refrigerating machines.

Operating Costs Reduced

Operation costs of the first experimental installations ran to about 22 cents per hour, but that figure has been reduced to around 15 cents an hour, Mr. Milener claims. In the Cleveland climate he believes the system would be operated from 400 to 800 hours per year, in the south probably 1,000 hours per year.

Usually the gas companies will be willing to make a preferred rate for air conditioning loads in the summer, he believes, because the gas used would counter-balance the winter heating load.

R. C. Doremus of Detroit asked what price the system should sell for, and was answered that the cost would be about the same as for gas-fired winter air conditioning systems.

Answering a question of A. R. Stevenson, Mr. Milener pointed out that the system produces about half the dry-bulb temperature reduction as does theatre air conditioning equipment, but a greater dehumidification.

A. W. Ruff of York, Pa., asked whether air was recirculated through the machine, Mr. Milener replying that it can be done either way.

POLICE BOAT GETS COOLER

SAN FRANCISCO—San Francisco's new police patrol boat, the "D. A. White," has been equipped with a W-3 model Frigidaire.

The power yacht, costing the city $27,450, has a teakwood deck, salon, and pilot house. The Frigidaire is used to preserve the food in the galley.

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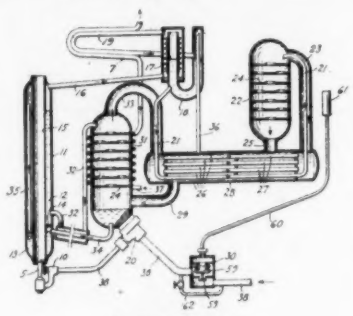
Review of Latest Patents

ISSUED JAN. 12, 1932

(Continued from Last Issue)

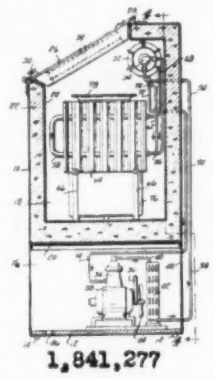
1,841,136. REFRIGERATION. Alvar Lenning and Robert Seth Taylor, New York, N. Y., assignors to Electrolux Servel Corp., New York, N. Y., a Corporation of Delaware. Filed Jan. 4, 1929. Serial No. 330,222. 11 Claims. (Cl. 62—5.)



1,841,136

1. Refrigerating apparatus comprising a heat-receiving part, a heat-rejecting part, a gas burner adjacent the heat-receiving part, a gas supply conduit connected to the burner, a valve in the gas supply conduit operative to close the gas supply when the temperature adjacent the burner falls below a given value, and a second valve in said conduit responsive to temperature of said heat-rejecting part and operative to close when the temperature of the heat-rejecting part rises above a given value and to open when the temperature of the heat-rejecting part falls below a given value.

1,841,277. REFRIGERATED DISPLAY CABINET. John Hayes Carter, Harrison, N. Y., assignor to Servel, Inc., New York, N. Y., a Corporation of Delaware. Filed Dec. 31, 1929. Serial No. 417,722. 3 Claims. (Cl. 62—89.5.)



1,841,277

2. In a display refrigerator, a chamber to be cooled, evaporator coils disposed intermediate the top and bottom of said chamber allowing storage space around and below said coils, heat radiating fins on said coils, a display receptacle adapted to be supported on said fins, an evaporator in the upper part of said chamber, and means for supplying liquid refrigerant to said evaporator elements.

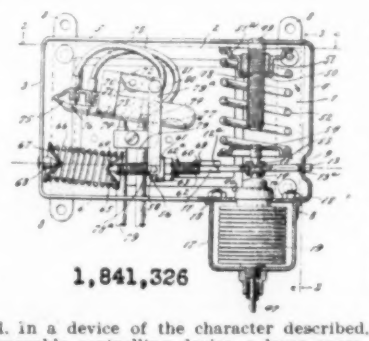
1,841,293. ABSORPTION REFRIGERATING APPARATUS. Carl Georg Munters, Stockholm, Sweden, assignor to Electrolux Servel Corp., New York, N. Y., a Corporation of Delaware. Filed Oct. 8, 1928. Serial No. 310,985, and in Sweden Oct. 11, 1927. 22 Claims. (Cl. 62—119.5.)

1. That improvement in the art of refrigeration through the agency of an absorption apparatus including an evaporator and a circulating system for an inert gas which comprises heating said gas in an ascending leg and cooling it in a descending leg of the circulating system, and causing said gas to flow upwardly through the evaporator counter-current to liquid refrigerant passing there-through due to said heating and cooling thereof.

1,841,298. SHAFT SEAL FOR COMPRESSORS. Clyde Edward Ploeger, Evansville, Ind., assignor to Servel, Inc., New York, N. Y., a Corporation of Delaware. Filed Sept. 7, 1929. Serial No. 390,924. 1 Claim. (Cl. 286—11.)

In a shaft seal a perforated wall, a shaft extending through said wall, a bearing ring fixed to said shaft, and a bearing member fixed to said wall, said bearing member having an inwardly turned flange engaging said bearing ring, an outwardly turned flange for attachment to said wall and a substantially cylindrical web connecting said flanges, whereby distortion of the outwardly extending flange incident to its attachment to said wall is not transmitted to the inwardly turned flange.

1,841,326. CONTROLLING MEANS. Lewis W. Eggleston, Buffalo, N. Y., assignor to American Radiator Co., New York, N. Y., a Corporation of New Jersey. Filed May 23, 1925. Serial No. 32,401. 26 Claims. (Cl. 200—83.)

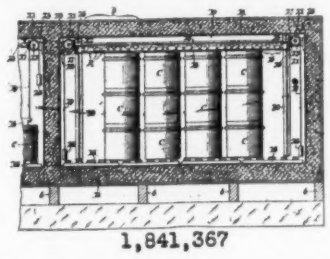


1,841,326

1. In a device of the character described, a movable controlling device, a lever operatively connected to said device and fulcrumed at one end, an expansible-collapsible element located at one side of said lever and operable to move the lever in one direction, a spring located on the opposite side of said lever and opposing action of the same by said element and being operable to move said lever in the opposite direction, and a regulating spring having a fixed support at one end and acting lengthwise on said lever, said regulating spring being adjustable to determine the operating differential of said device by said element and by said first-named spring.

ISSUED JAN. 19, 1932

1,841,367. REFRIGERATOR TRUCK BODY. William S. Eubank, Philadelphia, Pa., assignor to James H. Bell, Philadelphia, Pa. Filed Nov. 11, 1929. Serial No. 406,189. 8 Claims. (Cl. 62—91.5.)



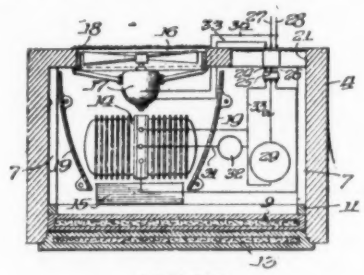
1,841,367

1. A refrigerator truck body affording a refrigerating chamber with surrounding walls of thermo-insulation; and a floatingly-sustained automatically-descendable support for a layer of solid carbon dioxide above the articles undergoing preservation in the refrigerating chamber.

1,841,499. PUMP FOR REFRIGERATING MACHINES. Thomas I. Potter, Portland, Ore. Filed Nov. 4, 1929. Serial No. 404,586. 5 Claims. (Cl. 230—206.)

1. In a refrigerating machine the combination of a compressor, an oil separator mounted at the top thereof, a conduit extending from the oil separator to the bottom of the crank case of the compressor, an equalizing pipe extending from the top of the crank case to the top of the separator, and a bottomless compartment formed at the top of said separator in which freed refrigerant can be collected and withdrawn for condensation purposes.

1,841,616. REFRIGERATING APPARATUS. Carl E. L. Lipman, Beloit, Wis., assignor to Lipman Patents Corp., Chicago, Ill., a Corporation of Delaware. Filed Oct. 7, 1927. Serial No. 224,572. 2 Claims. (Cl. 62—116.)



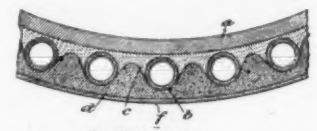
1,841,616

1. The combination with a refrigerator cabinet, of a refrigerating unit and support therefor removably mounted in said cabinet, said unit including a compressor motor carried by said support, a fan and motor therefore fixedly mounted in said cabinet independently of said support in position with respect to said unit for cooling the same when the support and unit is in position, an electric circuit, a part thereof carried by said support and including said compressor motor, and a second part fixedly carried by said cabinet and including the fan motor, a source of current, and means whereby the two parts of said circuit are automatically connected to the source of current when the unit is inserted in position and disconnected from said source when the unit is removed.

1,841,617. REFRIGERATING SYSTEM. Carl E. L. Lipman, Beloit, Wis., assignor to Lipman Patents Corp., Chicago, Ill., a Corporation of Delaware. Filed Oct. 7, 1927. Serial No. 224,573. 6 Claims. (Cl. 62—116.)

1. The combination with a refrigerator cabinet provided with a storage chamber, of a removable refrigerating unit including a high pressure side, a casing for said high pressure side open at one end, and an expansion element carried by said unit exteriorly by said casing in communication with said chamber, said cabinet being provided with an opening adapted to register with the open end of said casing, the interior of said cabinet being adapted to form a seal with the edges of said casing at the open end thereof when the unit is in operative position for insulating the high pressure side from said element.

1,841,762. HEAT EXCHANGE WALL FOR CONTAINERS. Richard Samesreuther, Butzbach in Hessen and Georg Kranzlein, Hochst-on-the-Main, Germany, assignors of one-half to I. G. Farbenindustrie, Aktiengesellschaft. Frankfort-on-the-Main, Germany, and one-half to Samesreuther & Co., m. b. H., Butzbach in Hessen, Germany. Filed June 20, 1927. Serial No. 200,257, and in Germany June 22, 1926. 3 Claims. (Cl. 257—248.)



1,841,762

1. A plate or wall of a vessel having welded thereto a tube adapted for the passage of heating or cooling fluid with interposition of a strip of soft metal of good heat conductivity between the tube and the plate or wall.

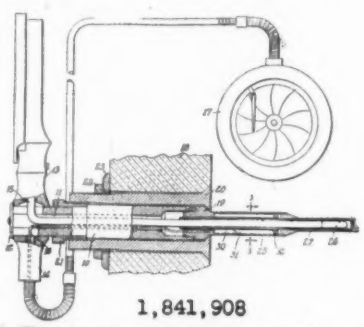
1,841,776. REFRIGERANT. Louis V. Aronson, Newark, N. J., assignor to Art Metal Works, Inc., a Corporation of New Jersey. Filed Jan. 30, 1929. Serial No. 336,121. 1 Claim. (Cl. 252—5.)

A mass of compressed refrigerating material consisting of a water soluble cold producing solid contained in a water soluble capsule.

1,841,808. WATER COOLER. Louis W. Hassensall, Toledo, Ohio. Filed Nov. 9, 1929. Serial No. 406,011. 9 Claims. (Cl. 62—91.5.)

1. In a water cooler, a casing, a crock in said casing open at its top, the casing and crock having their walls formed with alined openings, a sleeve extending through the openings of the crock and casing, a container for a cooling medium in said crock having an open end engaged with the inner end of said sleeve, and a removable closure for the outer end of said sleeve formed with openings whereby gas may escape from the container through the sleeve and closure.

1,841,908. DUPLEX THERMOMETER UNIT. Alphonso Noble, Naugatuck, Conn., assignor to The Bristol Co., Waterbury, Conn., a Corporation of Connecticut. Filed Mar. 13, 1929. Serial No. 346,565. 5 Claims. (Cl. 73—52.)



1,841,908

1. Thermometer apparatus comprising an annular temperature-responsive member, a second temperature-responsive member projecting through the first-named member, a support upon which both are mounted and whereby they are adapted for insertion as a unit through a single opening in the wall of a containing vessel, and for simultaneous exposure to the temperature of the material contained in said vessel.

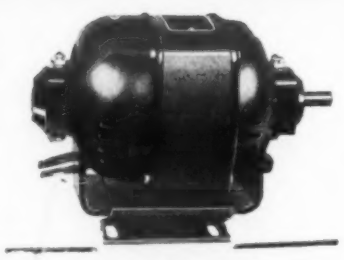
5. Thermometer apparatus, comprising an elongated casing axially bored through, a thermometer stem passing through the bore of said casing with bulb projecting beyond the far end of the same, a tubular extension through which said stem passes, secured to the far end of said casing in a substantially coaxial relationship, a sleeve mounted about the thermometer stem portion within the tubular extension and connected at one end to said casing to be sealed thereat, the bulb of said thermometer extending beyond the tubular extension, a protective shield about said bulb and secured to said tubular extension, a washer sealing the sleeve to said tubular extension at the opposite end to provide thereby a closed annular chamber about the said portion of the thermometer stem within the tubular extension, and a capillary tube opening into said chamber and extending through the bore of said casing.

1,841,935. REFRIGERATING APPARATUS. Frank A. Browne, Wayne, Pa., assignor to The Barber Asphalt Co., Philadelphia, Pa., a Corporation of West Virginia. Filed Feb. 13, 1928. Serial No. 253,961. 3 Claims. (Cl. 62—115.)

1. In a refrigerating system, a refrigerant compressor, a vaporizer, a pressure line through which refrigerant passes from the compressor to the vaporizer, a lubricant

(*Continued on Page 9, Column 1*)

Bulletin No. 28



tells why builders of refrigerator equipment mount Leland motors on their product. Briefly, this special Leland motor has:

A rubber-impregnated, cradle mounting that makes the motor vibration free—

A simple and sure brush-lifting device that eliminates brush noises—

A self-filtering lubrication system along with generous bearing areas that also contribute to the quietness in operation of this unit.

Bulletin No. 28 explains

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Rome-Turney Radiator Co., Rome, N.Y.

Issued in Refrigeration

(*Continued from Page 8, Column 5*)

separator in said pressure line including a spiral tube of small diameter through which fluid from the compressor passes, and a vapor line through which refrigerant passes from the vaporizer to the compressor.

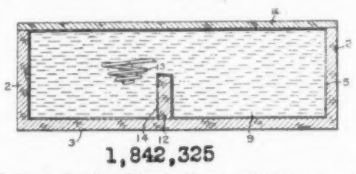
1,841,943. BOTTLE DISPENSING REFRIGERATOR. Chester A. Frick, Muncie, Ind., assignor to Glascock Brothers Mfg. Co., Muncie, Ind., a Corporation of Indiana. Filed Nov. 17, 1928. Serial No. 320,197. 4 Claims. (Cl. 220—9.)

1. A refrigerator comprising an inner tub substantially rectangular in shape, insulating material covering each of the four side walls of said tub, a metal panel for each of the side walls covering said insulating material, four corner posts comprising angle members arranged at each corner of said structure, the angle members being extended to provide supporting legs therefor, the edges of the panel members being inturned to form flanges and the edges of the angle members being inturned to form mating flanges, and means for connecting said flanges to secure the panels to the legs and form an outer casing for the support of said tub.

1,842,085. RUST PROOFING COMPOSITION AND METHOD OF MAKING THE SAME. Matthew Green and Elmer M. Jones, Detroit, Mich., assignors to Parker Rust-Proof Co., Detroit, Mich., a Corporation of Michigan. Filed Oct. 24, 1925. Serial No. 64,569. 13 Claims. (Cl. 148—6.)

5. The process of forming a rust-proofing compound, which comprises stirring iron fragments while slowly adding thereto an approximately 65 per cent solution of phosphoric acid until the amount of solution added is substantially in the proportion of two quarts to one pound 2.29 ounces of the iron used, thereafter stirring in manganese dioxide in substantially the proportion of 4.96 oz. to the pound of iron, and finally stirring in manferine to an amount substantially equal to 5.84 oz. for each pound of iron.

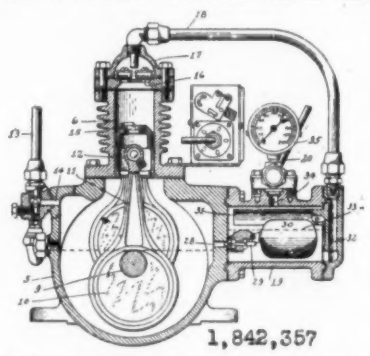
1,842,325. FOOD CABINET. Frederick W. Holderle and Carl L. Holderle, Rochester, N. Y. Filed Jan. 17, 1930. Serial No. 421,403. 5 Claims. (Cl. 62—101.)



1,842,325

1. In a food cabinet, the combination with a refrigerant chamber having a cooling coil therein, of a cooling chamber communicating therewith, a liquid refrigerant in said chambers, and heat insulated means for confining the circulation of said liquid refrigerant between said chambers to the upper portion thereof.

1,842,357. DOMESTIC REFRIGERATING MECHANISM. Walter W. Williams, Bloomington, Ill., assignor to Williams Oil-O-Matic Heating Corp., Bloomington, Ill., a Corporation of Illinois. Filed Nov. 17, 1930. Serial No. 496,217. 7 Claims. (Cl. 62—115.)



1,842,357

1. A compression type of refrigerating mechanism including a crank case, compression cylinders opening thereinto, said crank case containing a bath of lubricant for lubricating the moving parts of the compressor, means for admitting a gaseous refrigerant to be compressed into the crank case, means for separting such lubricant as is carried by the refrigerant from the compressor including a separating chamber adapted to contain a pre-determined amount of lubricant and automatically returning the lubricant collecting in said chamber above the pre-determined amount to the crank case, and means conducting the compressed refrigerant from the compressor to the separating chamber and discharging it below the lubricant contained therein.

ISSUED JAN. 26, 1932

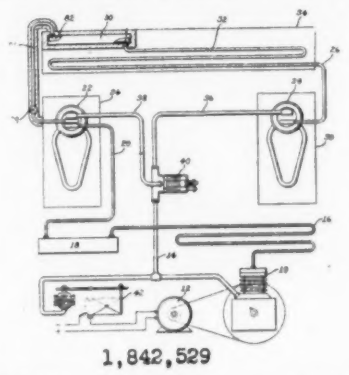
1,842,389. HEAT EXCHANGE DEVICE. Charles B. Dalzell, Little Falls, N. Y., assignor to Cherry-Burrell Corp., Wilmington, Del., a Corporation of Delaware. Filed Feb. 14, 1931. Serial No. 515,748. 6 Claims. (Cl. 257—247.)

1. A heat exchange device comprising connected outer tubes, connected internal tubes extending lengthwise through said outer tubes, and a locking device for each of said internal tubes, comprising a contractible ring surrounding said tube but disconnected therefrom, and a wedging device adapted by relative longitudinal movement between the same and said contractible ring to contract the latter about and cause it to firmly grip and hold said internal tube.

1,842,492. LIQUID SEAL FOR ABSORPTION SYSTEMS. Albert C. Schickler, Cleveland, Ohio, assignor to Edmund E. Allyne, Cleveland, Ohio. Filed Sept. 8, 1927. Serial No. 218,280. 4 Claims. (Cl. 62—120.5.)

1. Refrigerating apparatus of the intermittent absorption type, comprising an evaporator, a condenser, still-absorber means, means for conducting condensed refrigerant to the evaporator, and trap means connected to drain by gravity from the bottom of the evaporator to said conducting means and containing a heavy sealing liquid, the entire trap means from its connection to the evaporator to its connection to the conducting means lying below the evaporator, thereby maintaining a pre-determined column of desirable refrigerant within the evaporator and draining weak liquor from the evaporator to said conducting means.

1,842,529. REFRIGERATING APPARATUS. David E. Maccabee, Dayton, Ohio, assignor to Frigidaire Corp., Dayton, Ohio, a Corporation of Delaware. Filed Mar. 31, 1930. Serial No. 440,493. 5 Claims. (Cl. 62—115.)



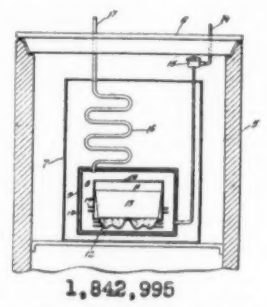
1,842,529

5. Refrigerating apparatus comprising in combination a relatively high pressure evaporator having a gas and liquid separating chamber, a relatively low pressure evaporator, a liquid inlet to said high pressure evaporator, and means responsive to the quantity of liquid in said chamber for controlling the passage of liquid thereto, a conduit leading below the level of liquid in the high pressure evaporator, to the inlet of the low pressure evaporator, a liquid refrigerant reservoir interconnecting said conduit above said high pressure evaporator, said reservoir being adapted to receive its liquid refrigerant only due to the difference in pressures in said evaporators, said reservoir having a greater cross sectional area than said conduit, and means for controlling the admission of liquid to said low pressure evaporator, the apparatus being arranged to supply liquid refrigerant to said reservoir when the pressure differential is high to thereby provide for the supply of liquid to the low pressure evaporator when the pressure differential is low.

1,842,660. AIR CONDITIONING MEANS. Fred John Day, Los Angeles, Calif. Filed Aug. 7, 1929. Serial No. 384,134. 3 Claims. (Cl. 62—24.)

1. In a refrigerator car, the combination with an ice bunker having an upper opening affording communication between the ice bunker and the interior of the car; of a detachable panel adapted to overlie said opening, a fan mounted upon and supported by said panel, there being an aperture through said panel adapted to direct a current of air created by said fan from the upper interior portion of the car through said panel into said bunker.

1,842,995. REFRIGERATING SYSTEM. Glenn Muffly, Detroit, Mich., assignor to Copeland Products, Inc., Detroit, Mich., a Corporation of Michigan. Filed April 3, 1926. Serial No. 99,625. 21 Claims. (Cl. 62—95.)

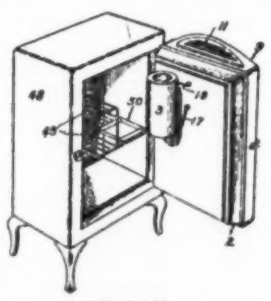


1,842,995

1. In a refrigerating system, a receptacle for direct water to be frozen, an evaporating chamber at least partially surrounding the receptacle, said receptacle forming a wall of said chamber, means for supplying liquid refrigerant to said chamber and means for insulating said evaporating chamber from a source of heat external thereto.

21. In combination with a refrigerator cabinet, a cooling unit therein comprising a plurality of receptacles nested one within the other, adjacent receptacles being spaced from each other to form chambers surrounding the inner receptacle, means for supplying refrigerant to one of said chambers, the next adjacent chamber surrounding the last mentioned chamber serving as a heat transfer insulation therefor, and liquid in the chamber next to and surrounding the chamber serving as a heat transfer insulation.

1,843,005. REFRIGERATING MACHINE. Christian Steenstrup, Schenectady, N. Y., assignor to General Electric Co., a Corporation of New York. Filed Sept. 12, 1928. Serial No. 305,518. 13 Claims. (Cl. 62—116.)



1,843,005

1. A refrigerator cabinet having a door opening and a door member, means for supporting said door member for movement about a vertical axis, a refrigerating machine carried by said door member, said refrigerating machine comprising an evaporator, a compressor and a condenser, said evaporator being located on one side of said door member, and said compressor and said condenser being located on the other side of said door member.

1,843,026. HEAT TRANSFER SYSTEM AND METHOD. Franklin B. Hunt, Chicago, Ill., assignor to Dryice Equipment Corp., New York, N. Y., a Corporation of Delaware. Filed July 17, 1930. Serial No. 468,601. 25 Claims. (Cl. 62—91.5.)

1. A method of refrigeration which includes evaporating a liquid by heat absorbed in a region to be cooled; conducting resulting vapor in operative relation to the refrigerant, to recondense the same to liquid, said recondensation taking place in one portion of a condenser while the heat is conducted to the refrigerant in a different portion of the condenser through a comparatively thick metallic path; conducting the liquid back to the region to be cooled in continuous circuit; and controlling evaporation to control the temperature in the refrigerated region by controlling flow of fluid between the evaporator and the condenser.

1,843,038. REFRIGERATED PACKAGE AND METHOD. Howard S. McIlvain, Belleville, N. J., assignor to Dryice Equipment Corp., New York, N. Y., a Corporation of Delaware. Filed Oct. 29, 1930. Serial No. 491,853. 20 Claims. (Cl. 62—91.5.)

13. A refrigerating apparatus comprising an outer receptacle, a refrigerating space within said receptacle, combined refrigerant containers and spacers within said space, said containers being arranged to maintain the refrigerant in its original position and provide insulating spaces along the sides of the refrigerant for the reception of gas and unrestricted paths leading from the refrigerant to said insulating spacers.

1,843,055. REFRIGERATORY CONTAINER. Joseph Weinstein, Brooklyn, N. Y., assignor to Dryice Equipment Corp, New York, N. Y., a Corporation of Delaware. Filed June 22, 1927, Serial No. 200,515. Renewed Mar. 21, 1930. 7 Claims. (Cl. 62—91.5.)

1. In a device of the class described, the combination with an exterior collapsible container, of an interior bottle connected with the container, inverted U-shaped springs pivotally connected at one end of the bottle, metallic strips secured to the inner sides of the container, and the other ends of the springs being connected to the metallic strips, to normally urge the collapsible container into open condition.

CHICAGO FIRM ANNOUNCES NEW COIN METER DEVICE

(*Concluded from Page 1, Column 3*)

dial which lights up when more coins are required. During defrosting the jewel will light up and remain lighted during the defrosting period.

The clock jewel light and coin collector remain in operation even though the refrigerator is disconnected and not operating.

Quarter-a-day Refrigeration

After the refrigerator has been fully paid for, the clock can be disconnected and used in any part of the house.

PATENT OFFICE WORK SPEEDED LAST YEAR

WASHINGTON, D. C.—The Patent Office passed on 20,128 more applications last year than it received, accomplishing 14 months' work in 12 and reducing an average of two months the time an inventor had to wait for official action on his application for a patent, the Department of Commerce announced recently.

Bigger Staff, Better System

Commissioner Thomas E. Robertson attributed the increased volume of work to an increase in his staff about 18 months ago, and the introduction of a new supervising system to make for accuracy and better handling of applications.

On Dec. 31, 1930, there were 110,402 applications awaiting action, whereas on Dec. 31, 1931, this number had been reduced to 90,274. This progress was made in the face of an influx of 20,000 amended applications per month, an increase of 2,000 monthly over the number received two years ago.

Decrease in Applications

This increase in amended applications more than compensated for a drop in patent applications of around 10,000 from 1930 to 1931.

Last year applications numbered 79,513, as against 89,397 in 1930, when a record for any single calendar year was established. These figures include only applications for new patents.

The Patent Office has 63 divisions with 10 or 11 examiners in each. At the beginning of last year only seven of these divisions were less than six months behind in the handling of applications. This number was increased to 48 at the end of the year, while 29 divisions were less than five months behind.

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CONTINENTAL-DIAMOND FIBRE COMPANY

NEWARK DELAWARE

IONIC CONTENT OF AIR IN ROOM IS AFFECTED BY HUMAN PRESENCE

CLEVELAND—The entrance of human beings into a room causes a marked decrease in the ionic content of the air to a low value which remains constant until the occupants leave, but the ionic content again rises soon after the people depart.

So C. P. Yaglou, assistant professor of industrial hygiene at the Harvard School of Public Health, declared in a paper presented to members of the A.S.H.V.E. and A.S.R.E. in the first joint session on air conditioning, Jan. 27, in Cleveland.

Mr. Yaglou's conclusions were based on research conducted at the Harvard School of Public Health in cooperation with the A.S.H.V.E. research laboratory. The experiments included studies of the ionic content of air in rooms first, with no ventilation; second, with window-gravity ventilation; and third, with air conditioning equipment supplying the rooms.

Method of Counting Ions

To measure the ionic content of the air in a room, a stream of air is induced down a "condenser," or upright flue, in the center of which is a metal charged to a known potential with a polarity opposite to that of the ions to be counted.

The charged rod is electrically insulated, and connected to the quartz fibers of an electrometer. As the air passes down the condenser tube, ions of the opposite polarity are attracted to the rod, and on striking it extract a quantity of charge equal to their own. From the rate of discharge of the electrometer, and the rate of air flow—measured by an orifice meter—the number of ions per unit volume of air can be computed, Mr. Yaglou explained.

In the first series of tests, seven people were seated in an air-tight steel chamber, 550 cu. ft. in capacity, and readings taken of ionic content before they entered and while they were in the chamber.

Ions Decrease When People Enter

Both positive and negative ions decreased from an initial concentration of about 250 ions per cu. cm. to about 50 after the people had been in the chamber for 85 minutes, Mr. Yaglou stated. "The decrease was very rapid during the first 20 minutes, gradual after that."

Another set of experiments included readings of ionic content of the air in large rooms ventilated only by spasmodic opening and closing of windows as the occupants desired.

A representative group of data was taken in a classroom during a luncheon talk in which 34 people ate and smoked at will, while listening to a lecture. The occupants were at liberty to open or close windows and doors, and to come and go as they pleased.

Both positive and negative ions decreased from approximately 300 ions per cu. cm. to 65 ions per cu. cm. 20 minutes after the people entered. It took nearly an hour for the ionic content to resume its initial value after the people left, Mr. Yaglou reported.

He ascribed the minimum ionic content maintained while the room was occupied to the influence of radio-active substances in the plaster of the walls and to cosmic rays which penetrate metal walls and ionize the air of an enclosed space.

From these tests Mr. Yaglou came to the conclusion that it makes little difference whether or not a room is ventilated—there is a definite change in the air when a room is inhabited, he averred.

"The loss of ions in these experiments cannot be accounted for by respiratory processes alone, even if it is assumed that expired air is completely devoid or ions, because the volume of air breathed by the accupants (0.28 to 0.42 cfm. per person) is very small in proportion to the cubical content of the room—300 cu. ft. of air per occupant," he said, "so some of the loss must be caused by transpiration."

The last series of tests described by Mr. Yaglou concerned the ionic effect of room occupancy where complete air conditioning was possible, and measured the quantity of outdoor air that must be supplied per person per minute to maintain normal ionic content.

One warm day 24 people were seated in the conditioned room, and the ionic content of the air in the room was measured at various rates of air change, he explained. The air was cooled to a comfortable temperature by means of brine pipe coils in the air duct, but the dehumidifier was not used because of the ionic reduction which it caused.

"When the subjects entered the room, the fans were stopped, and the ionic content was allowed to fall to an irreducible minimum level. The fans were then started and kept running at constant speed until a new equilibrium was established," he stated. "The air supply was gradually increased to the maximum capacity of the fans."

Interpreting the readings, Mr. Yaglou found that a ventilation rate as high as 160 cfm. per person is barely sufficient to maintain normal ionic content of about 345 ions per cc. of air.

Moreover, the ionic content does not appear to be significantly higher than with no ventilation, when only the usual air supply of 30 cfm. is employed, he pointed out.

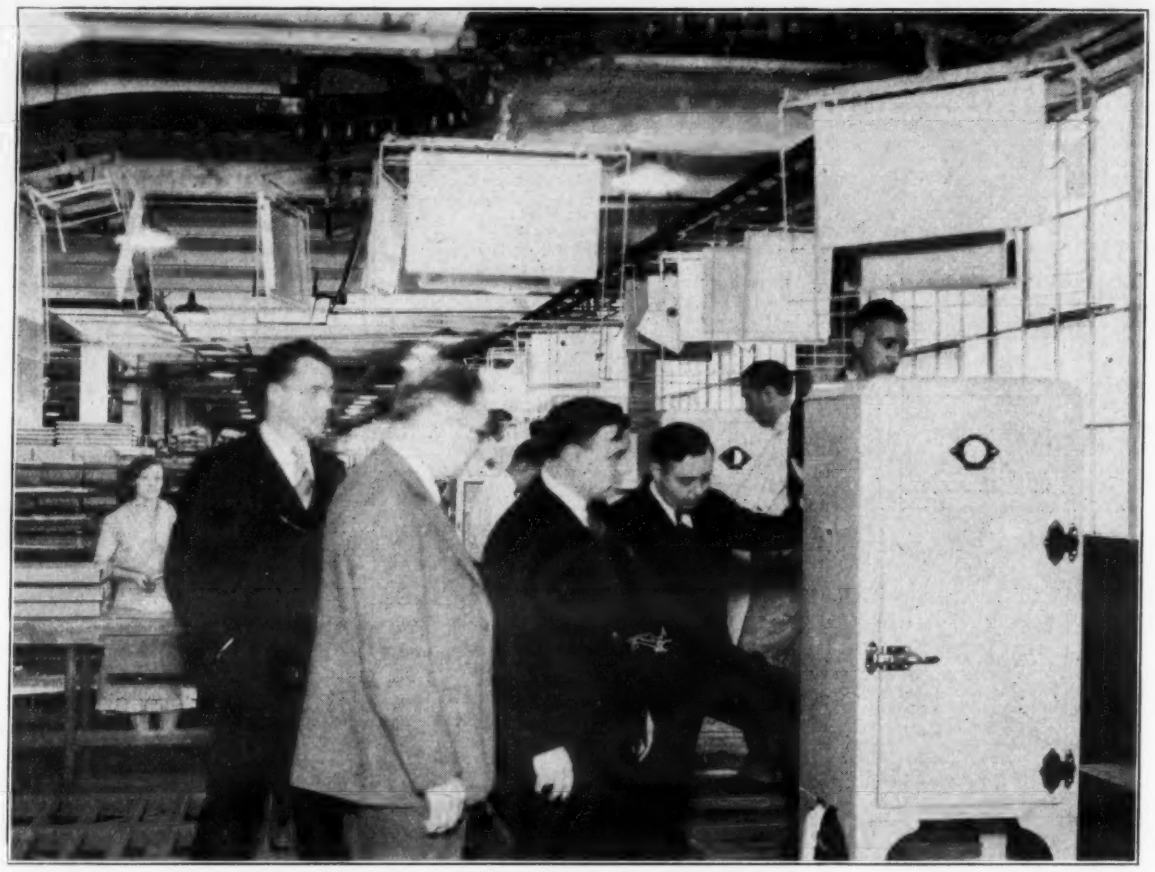
"From the foregoing experiments," Mr. Yaglou said, "it is evident that if the ionic content of air has any beneficial effects on health, some artificial method for ionizing the ventilating current must be employed."

A further experiment showed that it is possible with artificial ionization to control both the quantity and quality of ions at any desired concentration up to 10,000 ions per cc., with or without ventilation.

"The belief that modern systems of ventilation deprive the air of its ionic content by diffusion, by adsorption to grounded metal surfaces, and by overheating, were not confirmed in our experiments," he told the air conditioning men, "except when the air was brought in contact with a fine water spray through a dehumidifier."

Also in contrast with a prevailing belief, he reported that heating the air with units installed in connection with central fan systems increased both the positive and negative ionic content of the air.

First Off the Line



"The first one off the line!" Westinghouse Electric and Mfg. Co. officials view the first electric refrigerator cabinet to be made at the Mansfield works of the company. Left to right, the men inspecting the cabinet in the accompanying picture are: J. F. O'Donnell, assistant manager of refrigeration; E. M. Olin, works manager; L. C. VanDerau, works superintendent; L. K. Baxter, service manager, refrigeration division; Phillip Backman, foreman.

Field of Ice in Air Conditioning Shown

CLEVELAND — Advantages claimed for ice as the refrigerating medium for air conditioning systems were presented by R. T. Brizzolara, consulting engineer from New York City, before the A.S.R.E. annual convention here, Jan. 27.

Mr. Brizzolara was instrumental in the installation of the air conditioning systems employing ice which were put in use last summer by the Boston & Maine Railroad.

"Ice is readily available in many localities, or can be manufactured to meet air conditioning needs," Mr. Brizzolara claimed.

"Its rate of melting can be varied to give a wide range of refrigerating effect for air cooling," he continued, "and its rate of consumption in air conditioning systems can be entirely independent of the rate of production."

Good Rates on Power

Electrical energy for manufacturing ice to go into air conditioning plants can be purchased under the favorable rates offered by utilities to customers who buy current under the economic operating conditions of a constant load, he pointed out.

Also in his list was the claim that the control problem is simplified by the even temperature offered by melting ice, and the fact that large amounts of water are not drawn from the city water supply when ice is used to cool air.

For air conditioning purposes, Mr. Brizzolara pointed out, an ice manufacturer can sell the cheaper quality of ice, transporting it by truck at night when street traffic is light.

Shows Views of Ice Conditioners

He then showed lantern slides of several air conditioners which have been designed to utilize ice, expressing a preference for the induced draft type over the propeller type, because the former produces a positive air pressure in a building, forcing out indoor odors.

A Sturtevant ice conditioner occupies a space 2x2x4 ft., and has a 5-ton capacity, he claimed. It employs two McCord automobile radiators which offer 500 sq. ft. of surface for cooling.

Heat transfer coefficients vary from 3 to 18 B. t. u. per sq. ft. per hour per degree Fahrenheit temperature difference with air velocities varying from 100 to 1,000 ft. per hour.

He also showed slides of Carrier units of both suspended and cabinet types which are cooled by ice water.

Air Cleaned by Spray or Filters

Air cleaning in these conditioners may be accomplished by a spray of water, he explained, or by felt filters if they are finned tubing surface coolers.

He also mentioned the possibilities of spraying water into bunkers of Pakice, Flakice, or crushed ice, using the water drained from the bunkers to cool air, and varying the water spray by thermostatic control.

In answer to a question raised about the degree of dehumidification possible with ice conditioners, Mr. Brizzolara stated that the dehumidification was dependent on the number of degrees temperature differential between the wet-bulb temperature of the air and the surface temperature of the cooling unit.

Asked about regulation, he said that thermostatic control can be arranged to by-pass water around the ice chamber.

A. R. Stevenson of General Electric asked how much energy was used by the unit coolers for fans, pumps, etc.

Mr. Brizzolara responded, saying that a ¼-hp. motor is used for the fan, and a ½-hp. motor for the water pump. The large units, he reported, use about 1½-hp. in auxiliary equipment per ton of ice.

HEAT FLOW FACTORS GIVEN BY HOUGHTEN

CLEVELAND—Factors affecting heat flow through a roof were treated in a paper given before the air conditioning session of the A.S.H.V.E. and the A.S.R.E. in Cleveland by F. C. Houghten, director of the research laboratory of the A.S.H.V.E. research laboratory, Pittsburgh.

Cooperating with Mr. Houghten in the preparation of the material were J. L. Blackshaw, research engineer of the laboratory; E. M. Pugh of the Carnegie Institute of Technology, Pittsburgh; and Paul McDermott, research engineer of the laboratory.

Effect of Sun Movement

A large error can be introduced by failure to consider the periodic character of heat flow resulting from the diurnal movement of the sun and the heat capacity of the structure, he pointed out—factors which affect the magnitude of the heat flowing through the walls into a building on a hot, sunny day.

Test equipment for the studies included three 3-ft. square panels erected over a test chamber on the roof of the laboratory where an unrestricted view of the sun was available at all times. The floor and walls of the chamber were insulated with 4 in. of corkboard, joints being sealed with tar.

Temperatures, Humidities Constant

Provision for maintaining constant temperatures and humidities in the space below the roof panels was furnished by an ice-cold water spray, an electric heater, and a thermostat, Mr. Houghten explained.

Nicholls heat flow meters were fastened to the upper and lower surfaces of the panels to give instantaneous heat flow readings.

Complete reports of the tests may be obtained from the A.S.H.V.E. research laboratories, U. S. Bureau of Mines, Pittsburgh.

SUNSHINE PRODUCES IMPORTANT LOAD IN COOLING OF BUILDING

CLEVELAND—Judging from an extensive series of tests conducted with the air conditioning system of the Union Guardian Building, a 40-story Detroit office building, sunshine through the window glass is the most important factor to contend with in cooling, S. S. Sanford, sales engineer for the Detroit Edison Co., told members of the A.S.R.E. and the A.S.H.V.E. in their joint session on Jan. 27.

The research was carried on during the summer of 1931 in cooperation with the A.S.H.V.E. committee on research, assisted by E. P. Wells, air conditioning engineer for the Union Guardian Building, and J. H. Walker, superintendent of central heating for the Detroit Edison Co.

Sun May Give 75% of Load

The importance of the sunshine factor is indicated by the fact that at times it may account for as much as 75 per cent of the total cooling load necessary, Mr. Sanford declared.

He also recommended that cooling systems be zoned so that the side of the building on which the sun is shining can be controlled separately from the other sides of the building, and suggested that consideration be given to shadows from nearby buildings which may cover part of the sunny side of the building being cooled.

"If a building is provided with awnings so the window glass is shielded from the sunshine, the amount of cooling required will be less, and there will also be less difference in the cooling requirements of the different sides of the building," Mr. Sanford declared.

Suggests Double Glass Windows

Since the amount of heat entering through the walls in summer is of little importance compared with that coming through the windows of buildings in the latitude of Detroit, he concluded that the use of double windows would reduce the heat entering by direct radiation from the sun as well as that coming in by conduction.

The maximum rate at which solar radiation enters south windows is less than for east and west windows, he averred, because of the angle at which the sunshine passes through the glass. If there are overhanging ledges above the windows, these may be taken into account, he explained, because the glass area actually exposed to the sunshine is the important factor.

Charts of Cooling Load

Showing a chart indicating the total daily cooling and dehumidifying load and outdoor temperatures from May through October, 1931, he pointed out that the total cooling load for any day is in general proportional to the difference between the average temperature for the day and 55° F.

"It is affected somewhat, however, by the outdoor conditions prevailing during the previous day," he said.

He concluded by offering design figures for the heat entering walls and windows of office buildings in the latitude of Detroit:

Wall transmission.. 3 Btu./hr./ft.² wall
Glass transmission..17 Btu./hr./ft.² glass
Sunshine, east and
west sides .....160 Btu./hr./ft.² glass
Sunshine, south
side .....140 Btu./hr./ft.² glass

LEON V. QUIGLEY SPEAKS AT FOSTER D. SNELL DINNER

BROOKLYN—Leon V. Quigley, counsel on Public Relations, was the principal speaker at the annual dinner of Foster D. Snell, Inc., held at the Hotel St. George on Jan. 25. In his talk on "Building Business in Bad Times" it was emphasized that a professional or personal service organization must at all times anticipate the wants of its clients, give them not only the service they expect, but additional help they do not even realize they need.

Mr. Hedman, comptroller, compared the "Facts and Figures" of today with those of a year ago. Dr. Snell announced that Mr. Quigley had been retained as Public Relations counsel and that a quarterly house organ would begin publication shortly.

He then briefly summarized the events of the past 12 months, showed that progress had been made in spite of the depression, and predicted even greater progress for 1932. There were 21 members of the staff present, in addition to three associates and two guests.

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A. R. Stevenson Tells About Cycle That Both Heats and Cools

CLEVELAND—Picturing a refrigerating machine that will serve the dual functions of heating in winter as well as cooling a building in summer, A. R. Stevenson, Jr., stimulated considerable conjecture among engineers who gathered to hear his talk on the "Application of Refrigeration to Heating and Cooling of Homes" before the joint membership of the A.S.R.E. and the A.S.H.V.E. here on Jan. 28.

For several years the possibilities of providing both heating and cooling operations with one machine have interested Mr. Stevenson, a General Electric engineer and vice president of the A.S.R.E., and he admits that it is his pet hobby. Associated with him in the preparation of the paper were F. H. Faust and E. W. Roessler, also General Electric engineers from Schenectady, N. Y.

Mr. Stevenson began his discourse with a statement that a refrigerating machine is simply a heat pump which involves two separate (and usually different) quantities of energy — the amount of heat or energy pumped from a lower to a higher temperature, and the amount of energy or heat required to do the pumping.

"For example, in a large ice plant the input to the motor driving the ammonia compressor is about 43 kw. hr. for each ton of ice produced. The heat equivalent of 43 kw. hr. is 147,000 B.t.u. The amount of heat which must be removed from one ton of water at 32° F. to transform it into ice at 32° F., is 288,000 B.t.u. Thus, by an electrical input equivalent to only 147,000 B.t.u., it is evident that at least 288,000 B.t.u. were extracted from the water at 32° F.," he showed.

Explains Paradox

He then pointed out that the heat given off by the condenser of a refrigerating machine is approximately equal to the sum of the heat absorbed from the ice *plus* the heat equivalent of the input to the motor.

In the case of his ice plant example, the condenser would then be giving off the heat absorbed to make the ton of ice, 288,000 B.t.u., plus the energy input to the motor, 147,000 B.t.u., a sum of 435,000 B.t.u. which could be utilized for heating with an electrical input equivalent to 147,000 B.t.u.

To explain this apparent paradox, Mr. Stevenson gave the following hydraulic analogy:

Hydraulic Analogy

"Consider a reservoir of water 50-ft. above the ground and another reservoir of water 10-ft. below the level of the ground. A quantity of water at the ground level is required. If we allow water from the 50-ft. elevation to flow down directly, the only water received at the ground is that which came out of the 50-ft. reservoir. This corresponds to direct conversion of electricity to heat.

"If, however, we allow the water at the 50-ft. level to flow down through a perfect turbine waterwheel which is connected to a perfect pump, the power developed when 1 cu. ft. of water flows through the waterwheel from the 50-ft. level will be sufficient to pump 5 cu. ft. of water up to the ground level from the lower reservoir 10 ft. below the ground.

"With this arrangement, for every cubic foot of water that flows from the principal reservoir, 6 cu. ft. of water are received at the ground level."

System on Trial in California

The Southern California Edison Co. is trying out a system based on this principle this winter in its Los Angeles office building, Mr. Stevenson reported. Four 200-hp. synchronous motor driven compressors have been installed to cool the building in summer, and are being used to heat it in winter when outdoor temperatures are 42° F. or higher. Their engineers plan to use electric resistance heaters when the outdoor temperatures drop below 42° F., he said

Heat would be extracted from the outside air, according to Mr. Stevenson's proposal, by an outside evaporator, and distributed through the building from a condenser.

Explaining why the cycle has never been put to use on a commercial scale, he offered five reasons:

1. Refrigerating machines from 5- to 25-hp. have been lacking in the completely automatic features which such an installation would need.

2. Power costs have been too high to encourage the use of electrical heating equipment for buildings.

3. No one knows much about what operating costs would be because they would vary widely in different climates, and the system is now practically untried.

4. Because of the special nature of the equipment, estimates of the first cost cannot be made with accuracy until some have been made on a commercial basis.

5. The public still does not *demand* air cooling.

Disadvantages of System

The disadvantage of the system as compared with conventional heating systems, he pointed out, is that the operation of the machine would be directly dependent on outdoor temperatures. Because the capacity of the machine would be reduced on cold days, when heat is needed most, considerable excess capacity will be needed.

This could be partially overcome, he claimed, by powering the compressor with a multi-speed motor; by storing heat in hot water tanks during mild weather; and providing an auxiliary source of heat such as coal, gas, or electric resistance heaters.

Another objection—that the efficiency is reduced in cold weather—he converts to a possible advantage by pointing out that it operates at best efficiency for the longer periods of the year when the weather is mild.

Suited to Warm Climates

In Florida, demands of a heating system would require a machine about as large as necessary for cooling the house, but in Schenectady, N. Y., the heating requirements would be twice the cooling load, he reported.

When the surfaces absorbing heat from outdoors are below the freezing point, frost will collect on them, impairing the transfer of heat, he believes. This condition would not occur when the surfaces are above freezing, nor when the outside moisture content is low as in very cold weather, he declared.

This might be solved by using a spray tower with brine instead of water, he pointed out, or by intermittent defrosting or flexing of the heat transfer surface to crack off the ice.

Extracting Heat of Fusion

It has been suggested that the latent heat of water be extracted by freezing. In Washington, D. C., the amount of ice formed during the winter in heating a 14,000-cu. ft. well-insulated house would be 210 tons, or 7,800-cu. ft., which would make a pile about half the size of the house, Mr. Stevenson reported.

From a discussion of maximum and minimum temperatures in various parts of the United States, and comparative costs of operating compression and absorption refrigerating machines for both heating and cooling, Mr. Stevenson concluded that a machine large enough to heat a house would generally be large enough to cool it.

Radical departures from the distribution system of the conventional heating plant would probably be needed, ordinary radiators being too small, and necessitating drip pans to drain the moisture condensation in cooling, he pointed out.

A central forced air circulation system appears most feasible to Mr. Stevenson, since larger air ducts could be installed to accommodate the sizable volume of air that would have to be circulated using an air heater at about 100° F.

"The prospect of heating houses with heat pumps does not look very attractive economically in the northern part of the country where temperature differences are high," Mr. Stevenson stated.

In the southern half of the country, however, indications are that neglecting the high first cost of installation, the electric heating and cooling of houses is practical wherever a two-cent electrical rate is available, he believed.

Dispose of Ice Through Sewer

Following Mr. Stevenson's talk, Mr. Mowry of Niagara Hudson suggested that it might be practical to pick up heat from outdoors with a frost accumulation and dispose of the frost through the sewer system.

H. J. Stoever of Pittsburgh asked if a serious draft would be introduced into a house by circulating so much air in the winter. Mr. Stevenson referred the question to W. H. Carrier, president of Carrier Engineering Corp.

Mr. Carrier agreed that the warm air central circulating system might be impractical in some climates, but said he believes the plan may be feasible in southern places when cooling becomes more important. He complimented Mr. Stevenson on his studies, and intelligent presentation.

Carrier on Air Temperatures

Mr. Carrier also mentioned that 85° F. which Mr. Stevenson proposed for summer cooling, is probably too high, and cited experience of the Carrier engineers in air conditioning an office building in Phoenix, Ariz., where a 20-degree temperature reduction, from 105 to 85° F., had proved too small even with low humidities.

Owners of the Phoenix building provided additional cooling to 82° F., after trying the 85-degree temperature, according to Mr. Carrier.

Although 15° F. is constantly referred to as proper temperature reduction in summer, Mr. Carrier believes 82° F. should be regarded as a maximum point, with low relative humidities.

MUFFLY'S COMMENT

CLEVELAND—Glenn Muffly, consulting engineer of Copeland Products, Inc., Mt. Clemens, Mich., and newly elected president of the A.S.R.E., commented on Mr. Stevenson's paper for the general press, offering the following non-technical explanation:

"The statements made by Mr. Stevenson are rather beyond the ken of a layman and will puzzle many engineers, but they are based on well-established laws of physics.

"It is entirely possible to pump heat units into a building, for the purpose of heating it, by means of the same kind of a refrigerating system that is used to pump heat units out of a cold storage house or a refrigerator.

Put Evaporator Outside

"This is accomplished by the simple expedient of putting the 'evaporator' or cold portion of the system outdoors and the 'condenser' or hot portion of the system in the house. If the evaporator is designed so that it may also be used as a condenser, and vice versa, with the necessary pipe connections and valves to reverse the flow of refrigerant, we can use the same system for either purpose.

"Mr. Stevenson's statement that one kilowatt-hour, which equals 3,413 B.t.u., may be so used in a refrigerating system that it puts three times this number of heat units into the house is also correct and easily explained.

"A refrigerating system is a heat pump, used to move heat units from a cold place to a warm place. It pumps the B.t.u.'s uphill. It does not create any B.t.u.'s. It can move more heat units than are required to drive it, but the greater the temperature difference, the more power it takes to do the pumping.

Explanation

"A tank truck will carry a lot more gasoline up a hill than is consumed in driving the truck, but the higher the hill the nearer we come to using up all of our gasoline.

"If we got our power from water running down the hill, we would find it impossible to produce enough power to pump the same volume of water back up the hill.

"This 'heat pump' method makes it possible to use electric power two or three times as effectively as by turning the current directly into heat with the commonly known electric heating elements such as you find in a flat iron or in ordinary electrical room heaters.

"The heat pump apparently gives you back more energy than you put in, but the heat obtained in a 70° room has just been moved in from the colder outdoor air or from cold water. It should be recalled that 0° F is 460° F. above 'absolute zero,' or the point where all of the heat has been removed."

RADIO SHOW, MAY 23 TO 26

CHICAGO—The sixth annual trade show and eighth annual convention of the Radio Manufacturers Association will be held from May 23 to 26 in the Stevens hotel.

Allen, Laverty, Neeson Address Industrial A.S.R.E. Session

CLEVELAND—Problems of interest to the operator of industrial refrigerating plants were discussed by three engineers before the last session of the A.S.R.E. convention, on Thursday afternoon, Jan. 28.

R. C. Allen of the Westinghouse Electric & Mfg. Co., described developments in two-speed synchronous motors, telling about the characteristics and application of the new motors.

F. W. Laverty of Clark Bros. Co., Olean, N. Y., discussed the use of natural gas in the refrigerating plant, followed by C. R. Neeson of the Baldwin-Southwark Corp., Philadelphia, who presented studies in costs of operating oil engines on refrigerating machines.

Prepared with the cooperation of C. C. Shutt, also of Westinghouse, Mr. Allen's paper pointed out that the high power factor and high efficiencies of synchronous motors make them desirable for all kinds of loads where they can be used, but until recently they have been regarded as single-speed motors only.

Recent developments have shown that a synchronous motor in a single frame can be operated at two speeds, he claimed, proposing the salient pole method of obtaining two speeds—one double the other.

The rotor must have the number of poles which correspond to the lower speed, he pointed out. "Thus, a 150 r.p.m. motor at 60 cycles has 48 poles, and a 300 r.p.m. motor has 24 poles. The rotor of a 150-300 r.p.m. two-speed motor will have 48 salient poles.

"For the slow speed they are connected in the ordinary manner with an alternate north and south polarity around the rotor. At the high speed, the connections are made so that two adjacent poles will have a north polarity, and the next two a south polarity," he explained.

Since a compressor is essentially a constant-torque load, these motors are well suited to refrigeration when their torques are about equal at their two speeds, he told the group.

The control for the motors can be almost any type used for single speed units, he stated, such as the manual or magnetic, full or reduced voltage, or reactance or auto transformer.

Next on the afternoon's program was F. W. Laverty's discussion of the use of oil for fuel in the refrigerating plant.

There are more gas engines in use than most people think, he declared, many of them running 99 per cent of the time and requiring less than one per cent of their operating time for repairs.

Natural gas is found in every state but New Jersey, Delaware, North Carolina, South Carolina, Florida and the New England states, and the supply is large enough to last many years, he claimed.

In explaining how natural gas can be carried over great distances, he cited the new gas line from Amarillo, Tex., to Chicago. This was laid at an approximate expense of $75,000 per mile, and is 930 miles long, he announced.

Regardless of the efficiencies of Diesel and electric power, there are many instances where natural gas can be used more economically, he concluded, citing figures to prove his points.

Last on the afternoon's program was C. R. Neeson who declared that recent improvements in Diesel engine design have placed it in a position to compete with electric service in reliability as well as in operating costs.

"The Diesel engine is now built in speeds up to 1,200 r.p.m., permitting direct connection to most compressors," he said. "It is also being built to operate with very little vibration, while mufflers have been designed which practically eliminate the noise objection," he stated.

To reduce space, he described a combined Diesel engine and compressor which his company has designed for one frame. One cylinder of this machine is used for compression of the refrigerant, he explained.

The meeting concluded with a general discussion of the comparative costs of operating plants with electricity and with Diesel engines.

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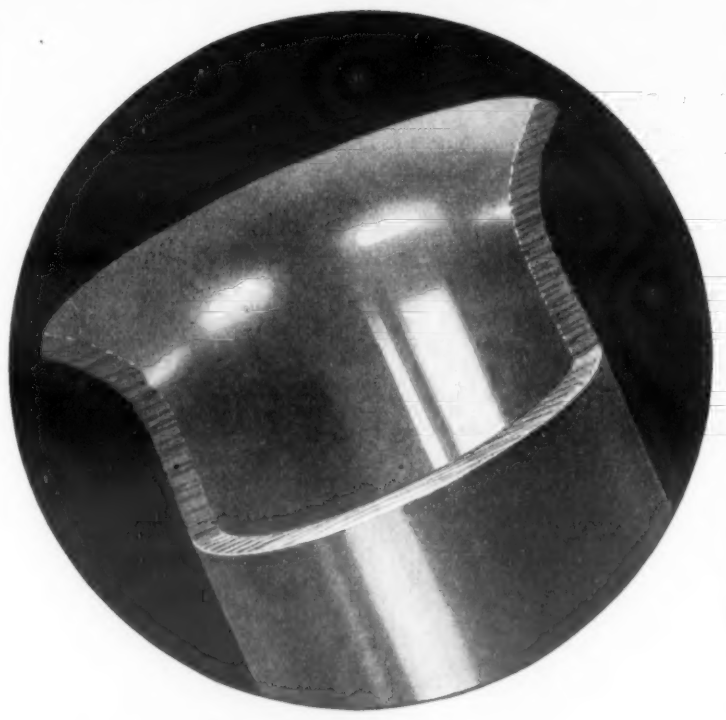

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